

THE SCOTTISH GEOGRAPHICAL MAGAZINE



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SCOTTISH CLACHANS

HORACE FAIRHURST

The very serious decrease in the population of the Highlands last century has been discussed from many angles and it is well known that the ruins of deserted settlements are widespread evidence of this decline. Traces of the abandoned houses, loosely grouped in clusters of perhaps half-a-dozen up to twenty or thirty, occur in almost every Highland district. Often they have been quarried for stone or overgrown with bracken and brambles, but sometimes a whole group has survived with startling clarity, perhaps on the edge of the moor. Many of the sites are shown on the Ordnance Survey Six Inch sheets and at the time of the original survey about the middle of last century, individual houses were still in occupation; many groups, however, were deserted and were not even indicated on the map.

Only a very small literature exists on the ruins themselves; generally they have been considered to be outside the scope of the Inventories of the Royal Commission on Ancient and Historical Monuments in Scotland. In a sense, however, they offer a field almost unique in Europe for the study of the folk life of a period which, in this era of rapid change, already seems remote. In drawing attention to the main characteristics of these settlements, the writer cannot claim any widespread knowledge on a regional basis but has had the benefit of discussions with a number of colleagues and their contributions have been acknowledged wherever possible.

Today, the clusters of ruined buildings often occur near the upper limit of possible cultivation and outside the modern arable land. Mr Gailey has shown in his article (p. 99) that in Kintyre, the extreme upper limit of the settlements is about 700 feet, but comparatively few are located above 500 feet. In the Eastern Highlands, with drier, sunnier weather and a higher average cloud-level, the upper limit is much higher and clusters appear at 1,000 feet or more. At lower altitudes and especially within the cultivated land of today, destruction has proceeded far more thoroughly and examples occur only on patches of rougher ground. A map showing the ruins of the deserted clusters would be only a shadow of the former distribution.

Speaking in particular of the Perthshire Highlands¹, the clusters

normally comprise dry-stone buildings of varying size. Long rectangular structures as much as 50 feet long by 14 feet internally with walls about 3 feet thick at the base, are the normal farmhouses of the period. Living quarters and byre were both under the one long roof and traces of a central drain sometimes indicate which end housed the cattle. A single doorway gave access to the byre which in turn gave the only entry to the living room. Sometimes the two were separated by a cross wall but in others, there is no indication superficially of any partition and if it existed, it must have been of a flimsy nature. Within the clusters, there is usually to be found an almost equal number of small cottages, somewhere about 30 feet in length which may have lacked a byre; sometimes too, a long house is to be seen sub-divided into single-roomed dwellings. At one end of the buildings, there is normally to be found, against the outside wall, a low platform of stones which was the peat store; this interpretation comes from a farmer at Tempair in northern Perthshire, who formerly lived in what is now a ruinous cluster on his land. He was insistent that one house was the old school room and was able to explain a small enclosure at the burn as the flax-retting pond.

Thatch appears to have been universal and in relatively well-preserved examples, crucks to support the roof were obviously slotted into the inner face of the dry-built wall. Mr Dunbar of the Royal Commission on Ancient Monuments, has pointed out to me that these slots were often at a height of four feet or so from the ground and as many of the ruins today do not attain that level, traces of the recess for the cruck are not readily found. The forms of the crucks have been discussed by Walton². There is no sign of a chimney stack in the gable-end except in examples known to have been recently inhabited, and a central hearth is clearly involved.

Associated with the clusters, but much fewer in number than the dwelling houses, are small walled enclosures within which the soil level has frequently been raised artificially; they presumably represent stack or stock yards, or gardens, and indeed even all three. For them the word 'garth' will be used here as a useful if ambiguous term. In addition to the dwellings, there are a few outbuildings, often with one open end, suggestive of barns or implement sheds. The remnants of old corn-drying kilns can sometimes be traced and in areas where limestone is available, a prominent limekiln is characteristic.

In plan, the clusters may exhibit no suggestion of an orderly arrangement of the buildings; each dwelling seems adapted to the aspect and slope of the immediate area on which it stands. In other clusters, a rectilinear lay-out is obvious; the siting of individual buildings may indicate rows or a vague grid-iron pattern, and elsewhere, the whole cluster may be linear. Two miles west of Killin, the ruins at Craignavie north of the river Dochart, are loosely grouped with no tidy arrangement, while at Lix on the south side, four small clusters are each rectilinear. At Newton, near the entrance to Glen Almond, the whole settlement is linear, though the site on a narrow shelf above the flat floor of the glen, lends itself to such a development. Though worth making, the distinction is not clear cut.

Moving away from Perthshire, regional variations in the general character of the clusters may be expected, but as yet, attention has been

largely focussed on variation in house type, which is considerable. Sinclair has provided an introduction to this aspect of the study³ and states that the type of farmhouse indicated above, with living quarters and byre under one roof, "while spread over a considerable area of the country, can be localised, as far as the Highlands are concerned, as the traditional form prevailing on the mainland of Argyll, including Lorn and Appin, and also in the islands of Islay and Jura. West Perthshire, too, adopted this style of building . . ."⁴

In the North-West, the characteristic dwelling was the 'black house' of which rare examples are still inhabited. The outstanding feature was the immensely thick wall which, until recently, was devoid of windows and the smoke from the central hearth found its way out either through the door or a hole in the roof. The structure was hip-ended and the outer corners somewhat rounded. In the Outer Isles and as far south as Tiree, the thatched roof was supported on the inner face of the thick wall, but in Sinclair's "Skye Type", the roof reaches to the outer face. Generally, the living quarters and byre were end-to-end under one long roof but another type existed in Lewis, as Captain Thomas clearly showed as early as 1868⁵. In this, the subdivision of the house was in double or even triple blocks, built side-to-side to give an arrangement in parallel blocks. However, the details have been discussed in what is already a substantial literature⁶, and the immediate purpose is to point out that the 'black house' is a marked regional variant of the windy North-West. Its distribution has not yet been precisely determined, at least in publications, though the School of Scottish Studies at Edinburgh University has accumulated much material on this and other types, and the Director, Mr Basil Megaw, is working on this problem.

The ruinous clusters of dwellings in the Highlands normally stand in isolation one from another but may occur with, or near, a church, mill, school or inn. It is quite clear, however, that none of these features was fundamentally part of the grouping and only the very few large settlements were provided with all four. Without these incidentals, the clusters represent a settlement type intimately associated with the old group-farms, worked in run-rig, with infield and outfield cultivation, involving the co-operative efforts of some four or more tenants. It would appear that the group-farm was in fact the *raison d'être* of the clustered dwellings. In their final phase as discussed in some detail below, these little groups of houses had often swollen in size in the century following the Rising of 1745. Even so, they cannot be called 'villages' in the accepted sense of the word, and they are more than mere hamlets.

A descriptive term is necessary from the point of view of settlement morphology and the word 'clachan' is coming into use. Professor Estyn Evans and his students from Belfast refer, in a technical sense, to similar clusters of dwellings in Northern Ireland as clachans⁷ and Dr Proudfoot has recently suggested that settlements analogous to clachans may have existed even before the Anglo-Norman conquest of Ireland⁸. The choice of this word which is of Gaelic origin, was made with some misgiving because it is used in Scotland, certainly to refer to a small cluster of dwellings in relative isolation and to the ruinous clusters considered above, but it is nearly always used in a Highland context and without any precise meaning. Many Scots would consider it both illogical and

irritating, if the word *clachan* were used, even in a technical sense, to apply to similar settlement forms which once prevailed in the Lowlands and for which characteristic Lowland expressions are current. To these Lowland settlements we must now turn, using '*clachan form*' in a morphological sense to avoid confusion with the Highland counterpart.

In the Lowlands of Scotland, travellers' accounts of rural settlement rarely throw much light on the period before the eighteenth century. The meagre character of the data on Scottish agrarian history in previous centuries has often been noted. It is abundantly clear, however, that even as late as the early years of the eighteenth century, housing conditions were deplorable⁹. Rural settlements consisted of dry-stone or sometimes clay houses, entered by a single door, with the byre at one end and the living quarters at the other, separated only by a flimsy partition, without a chimney stack for the hearth in the centre of the earth floor. Some reports indicate that the thatched roof was supported by crucks. The dwellings were undoubtedly in clusters and the method of group-farming in run-rig, by joint tenants, has often been described. A common Lowland description is '*ferm-toun*' and no doubt Scottish writers, especially when dealing with the major regional divisions of the country, will be glad to continue the use of this expression. In detail, the Lowland clusters were often qualified as *kirk-toun*, *mill-toun*, *castletoun*, if they happen to have been grouped around the one or the other.

It often comes as a great surprise to those who are familiar with the abbeys, castles and historic towns of the Lowlands, to learn that in practice, it is extremely difficult to discover examples of farmhouses and rural cottages which date back earlier than about 1750. The later part of the eighteenth century was the age of '*Improvements*' when a quite spectacular reorganisation of the countryside was undertaken to give the farms, hedges and woodlands of today. Almost literally, the old landscape pattern was erased. The period is well documented and it is clear that after a long period of stagnation, a tremendous effort was made to modernise. The field boundaries were set up on a new pattern as the old group-farms were replaced and the dwellings were destroyed as mere hovels of a bygone age. Their remains, now so often in ploughland or under the farmsteadings, villages and roads of today, are difficult to find without the research work involved in such papers as those of Third and Lebon¹⁰.

Undoubtedly, detailed field work has been neglected and a little personal experience may perhaps be intruded to indicate the extent of the change since the eighteenth century and the features which may survive. The district involved is that immediately around the writer's home, in a rural area only eight miles north-east of Glasgow. No large-scale map is available before the Ordnance Survey sheet of 1865.

The district was formerly known as '*the eleven ploughs of Balgrochan*' (a ploughgate contained about 104 acres) and was divided into three group-farms. Easter and Wester Balgrochan and Carlston. These were sub-divided into compact farms as early as 1736. The local village of Torrance is entirely a development of comparatively recent times and has no roots in the past. All memory of the precise limits of the old threefold division seems lost. The place names Easter and Wester Balgrochan refer now to two of the compact farms formed out of the old

ploughgates; both steadings lie at a junction of minor roads in a small cluster of dwellings, some modern and some dating back to the early nineteenth century. These are almost certainly on or near the sites of the old ferm-touns, but there is scarcely a trace of the ancient clusters; in a small field adjacent to East Balgrochan where the plough is apt to encounter 'hard places', rectangular lines of thistles sometimes appear after several years in grass. The third of the group-farms is divided now into East, West and Upper Carlston, but the site of the older settlement is unknown. Incidentally, many fields in the district still show traces of ridging, but this is uniformly at intervals of 16 feet and always seems to be in accordance with the modern field boundaries. It is later than the old 'rigs' and of them there is no sign. It might be remarked too, that locally, the mingling of place names in 'bal-' and '-ton' appears quite indiscriminate.

So thorough has been the destruction of the older settlement-form that it would almost seem that Lowlands Scots were determined to erase all memory of the old houses, built in the period of poverty before the 'Improvements', as carrying a slur of the primitive. How far back in time this 'clachan' settlement-form may reach in Lowland Scotland must be a matter for skilled excavation on sites yet to be investigated.

The obvious resemblances both in the general form of the settlement and in the character of the Perthshire and Argyll house-type, clearly indicate a very close connection between the Highland clachans of these areas and the Lowland ferm-touns. It is only too easy to assume that the deserted clusters in the Highlands date back at least two hundred years to the period of the ferm-touns. This impression is fortified in the mind of the casual observer by the ruins themselves, so frequently reduced nearly to foundations and occurring in rough ground where bracken is encroaching, outside the modern cultivated land.

It is relevant to remark that the dry-stone buildings which are characteristic, would in most cases very rapidly decay without constant renovation; examples which are still inhabited have generally been preserved by pointing with mortar or cement. It is questionable whether repair of such dry-stone buildings would be worth while after much more than a generation or two, without extensive rebuilding. A careful examination of a number of these deserted clusters has shown that they do not suggest a collection of dwellings of very varied ages and in fact, it is quite difficult to pick out buildings which are unquestionably much older than their neighbours. Similarly, it is extremely difficult, at least in the present state of our knowledge, to differentiate between the various clachan sites in terms of age. This is my experience in Perthshire and Mr Gailey's in Argyll. Even without detailed field work, however, it is possible to make a general inference from the broad picture of Scottish economic history, as to the periods when the clachans were in their hey-day and also when they were deserted.

The period of desertion varies in the different parts of the Highlands¹¹. Improvements in the Perthshire Highlands and southern Argyll began as early as about 1780, when the group-farms began to be replaced by single compact farms, thus removing the *raison d'être* of the clachan. In general, however the changes were not fully under way until the early nineteenth century, especially in the North-West where they were

much less thorough and the time lag was most marked. Even there, my colleagues who have been working on the Crofting Survey of the Geography Department, Glasgow University, are insistent that rarely, if ever, can a direct survival of the present crofting communities in the Outer Hebrides, be traced from the period before about 1800.

The clachans did not give place suddenly to the modern farms, cottages and crofts. Indeed the old 'black house' still survives in a few instances and the occasional clachan remains but little changed in appearance even as far south as Auchnangoul near Inverary. On Tayside, the house with a cruck-built roof at Camserney is a notable survival, and information obtained locally at Killin¹² indicates that the old long-house with its central hearth, earth floor and undivided byre, continued to be occupied in places into this century. Generally speaking, however, many clachans especially in the southern and eastern Highlands, must have been deserted in the period roughly between 1820 and 1850, when there was a catastrophic decline in the Highland population with widespread evictions and emigration.

As regards the date of construction of the buildings in the deserted clachans, it is most important to remember that the phase of catastrophic decline was preceded by a period of rapidly increasing population. After the Rising in 1745, there was greater security, roads were built, the potato came into use, the black-cattle trade flourished and some industry developed, including the kelp industry of the North-West and linen spinning in Perthshire. This expansion of the population is a well-established fact and must surely have been accompanied by a rapid growth in the characteristic rural settlement, the clachan. Though true villages were appearing in the later eighteenth century, and indeed were being carefully planned and compact farms were being introduced, these new settlement forms cannot have accounted for the great bulk of the population; otherwise, the later emigration and evictions could never have been on so great a scale. Consequently, what we now see only too often are the ruins of the swollen clusters, deserted almost immediately after a period of vigorous but unhealthy growth.

Widespread and detailed excavation could prove or disprove this hypothesis of an expansion of the clusters after 1745, but a less wasteful method would be to study estate plans of the last century. Excavation is needed for other purposes.

The idea of a rapid expansion of the clachans in the period preceding desertion, would suggest another clue. Disused and obsolescent dwellings of earlier times would provide obvious quarries for the stone needed for the additional houses. Moreover, within the Highlands, standards of living were beginning to rise and to lead to better housing conditions. Both new housing and rehousing were thus involved and dwellings of only a generation or so ago would soon tend to be regarded as obsolete. In summary, there is little justification, *a priori*, for assuming that the ruined clachans of today preserve much from the period before the middle of the eighteenth century.

The implications of what appears to the writer to be a reasonable contention, are considerable. What we now regard as rather primitive houses as displayed in the ruined clusters, with joint byre and living quarters, central hearth and earth floor, with dry-stone walls, were being

built in considerable numbers not much more than a century and a half ago. It also follows that a house type which was quite obsolete in the Lowlands was being adopted in the Highlands, presumably to replace something of an even cruder form. Before field work can be undertaken to find remnants of clachans and dwellings of the period earlier than about 1750, it is necessary to consider carefully the nature of the evidence which is likely to be available.

The first Military Survey of the Highlands (General Roy's map) on a scale of 1 inch to 1,000 yards, shows the distribution of settlement immediately after 1745 by means of dots, each group of which would appear to indicate a clachan. The map is known to be generalised, however, and the exact position of each dot on the ground is often difficult to determine, because of the quality of the cartography. Nevertheless, the survey is a most important document from the point of view of field work, bearing in mind, of course, the distinct probability that the clachan sites of the map underwent the renovation and expansion envisaged above.

Turning first to settlement form in the period before 1750, it is generally accepted that the group-farm and the clachan which are so intimately associated, have a long history behind them in Scotland. Miss Grant considered the problem in her studies of Scotland before 1603¹³. In the absence of documentary proof, however, it must be admitted that we are largely projecting into a more distant past the conditions prevailing in the early eighteenth century.

In view of the late date of so many of the ruined clusters of today, few deductions about ancestral forms can be attempted, though one might suggest that the markedly rectilinear pattern in some clusters is no more than the influence of improving lairds, or of local site-conditions. Apart from this, the most striking characteristic is the complete absence of any sign of a traditional pattern in the lay-out of the clachans; buildings are loosely grouped together and the site of each seems entirely a matter of immediate conditions of slope, shelter and aspect.

As regards the more ancient form, if it differed, there can be no doubt that some individual clachans, and probably many of them, were deserted at some time in the centuries before 1750, but no precise evidence is available. Incidentally, the remains of summer shielings are often to be found in lonely places on the hills; their function in relation to the group-farms is well known. They were in use for a few weeks in the summer during the period of the growing crops when the cattle were sent away from the unfenced fields to the fresh grass. The custom was general in the Highlands until at least the eighteenth century and survived in the Outer Isles until quite recently. It is only too easy to over-estimate the age of these very primitive looking shelters and to confuse them with ancient clachans.

The root problem in field work is obviously to establish the traditional house-form or forms in the period before 1750. In this respect, some of the most elementary facts are elusive. A variety of dwelling types belonging to the Scottish Iron Age is known to the archaeologist, but the record of where and in what type of house the common people lived, ceases from the Dark Ages onwards¹⁴. We do not know when the rectangular house plan superseded the round or oval form of pre-historic times.

The low rugged 'black house' of the stony and windy North-West is so much in keeping with the landscape, and has such an air of hoary antiquity that all too easily perhaps, its origins are relegated to the distant past. Away from the North-West, such a continuity of form can still less be taken for granted. It is to be recalled that many parts of the Western Highlands were sufficiently well-wooded to attract iron masters from the south in search of charcoal, as late as the eighteenth century. The necessity for building in stone may have developed only late in the history of many parts of the Highlands.

Turf (or peat) was another material which was used on occasion for building purposes, even in modern times. Kissling⁶ comments on its use and provides a photograph of a 'black house' built of peat in South Uist; Curwen¹⁵ also includes a photograph, apparently of the same house, and gives several references to Pennant's *A Tour in Scotland 1774*, suggesting a former widespread use of this building material; in fact, it is rather questionable whether Pennant was describing houses built of turf or merely roofed with it.

One of the Factor's Reports (for 1755) to the Commissioners for the Forfeited Estates remarks, probably for Perthshire, "The whole Houses of the Country are made up of Twigs manufactured by way of Creels called Watling & covered with Turff, they are so low in the Roof as to scarce admit a person standing in them"¹⁶. In Boswell's account of his tour in the Highlands with Dr Johnson in 1773, he described a house at a place in Inverness "in Glenmorison, callen Anoch" which "was built of thick turfs, and thatched with thinner turfs and heath. It had three rooms in length and a little room which projected. Where we sat, the side-walls were wainscotted, as Dr Johnson said, with wicker, very neatly platted. Our landlord had made the whole with his own hands"¹⁷.

Here is another reference. Writing about 1790 of the period forty years earlier, the minister for Forthingall on the north side of Loch Tay, states in the *Old Statistical Account of Scotland*, "At that time, the houses in Rannoch were huts of, what they called, "Stake and Rise". One could not enter but on all fours; and after entering, it was impossible to stand upright. Now there are comfortable houses built of stone". For "Stake and Rise", Jamieson's *Scottish Dictionary* gives, "Pales for enclosing ground. Formed by stakes driven into the earth and thin boughs nailed across; in some places, by twigs wattled and intertwined, which is the ancient mode".

Exaggeration, or merely the description of the meanest hovels, may be suspected but the impression remains that traces of houses and clachans of the period before 1750 may be extremely hard to detect.

INVESTIGATIONS AT LIX, PERTHSHIRE

Intensive morphological studies are indicated by many of the issues raised in this paper and tentative conclusions can be checked only by detailed investigation and excavation. It would be insincere to imply that the site to be described was selected with all the points in mind; in fact, analysis of the data obtained so far has involved a reconsideration, and often a rejection, of preconceived ideas. The full significance of the site has only slowly become apparent. The inquiry is far from

complete, but several firmly based conclusions already reached are clearly relevant to a general discussion. The site is large and team work is essential; Mr Gordon Petrie has directed the survey, Dr Proudfoot has co-operated in the excavation so far undertaken, and Mr Gailey and other colleagues and students from Glasgow have assisted in many ways.

Lix was a small barony in West Perthshire, some two and a half miles west of Killin which is at the upper end of Loch Tay. The first record we have found, dates to 1569 when Lik or Lycks was granted by the Carthusian monastery at Perth to a Ewan Campbell. By 1587, the lands were clearly divided into West, Middle and East Lix, each presumably a group-farm. After the Rising of 1745, much documentary evidence is available during the period when Lix was administered by the Commissioners for the Forfeited Estates. The fact that Mason used Lix as an example several times in his valuable paper on the state of the Highlands after the Forty-Five¹⁸ was a valuable indication that the documentary evidence was exceptionally useful. This material, in the Register House, Edinburgh, includes a plan drawn by Cockburn in 1755. Three clachans are shown; the site of one corresponds to the site of the present West Lix standing more or less: one lies just east of the Middle Lix steading: the one on East Lix has not yet been precisely located. The traces of the old clachan at Middle Lix consist of no more than vague grassy platforms where the buildings had once stood.

Quite distinct from these older clachans of Cockburn's plan, are the ruins of clustered dwellings readily apparent today. There are two small clusters at West and Middle Lix and five at East Lix. A characteristic long-house in one of these five groups, has been excavated and found to consist of living quarters around a central hearth, and a byre at the *upper* end of the house; Dr Proudfoot believes that this farmhouse was not built much before 1800. We found tenuous traces of an earlier occupation but no dating has been possible as yet.

The outlines of the story are clear enough. Lix was purchased in 1766 by the Earl of Breadalbane and shortly after 1780, the barony was re-organised. The old clachan at Middle Lix with four tenant farmers, was replaced by a small group of buildings further away from the burn, but the land quite soon became two single compact farms and some of the new dwellings began to be abandoned after a very short life.

On East Lix, there were nine tenants. The old clachan shown by Cockburn seems to have been obliterated, again soon after 1780, and the individual farmers were dispersed in twos and threes over the arable land. By 1823, a number of cottages had been added to the four main nuclei and four new 'clachans' were developing. This reversal to settlement form is most interesting; Mr Gailey has noted what seem to be parallel cases in Kintyre and has suggested the term 'dispersed clachan' for this phenomenon. By 1850, the last of the East Lix tenants, farmers and cottagers alike, had gone, the dwellings were completely abandoned, and the land was added to the neighbouring sheep farm of Acharn.

Today the solitary farmhouse of Middle Lix stands in an area where formerly there was a dozen tenant farmers and nearly as many cottagers. The clustered ruins at East Lix remain but little touched except by time, much as they were left just over a century ago. They belong essentially to the short period between 1780 and 1850. The old roads are clearly

traceable, as well as the field boundaries and indications of outfield up on the moor. The remains of old corn kilns can be seen too, and in fact, there is a museum of the period in its natural setting. East Lix offers other possibilities. Here and there are traces of what would appear to be the foundations of dwellings of an earlier period, quite probably before Cockburn and the clachan we hope still to locate.

It may well be that conclusions relative to one site at Lix have stimulated thought in particular directions and a more balanced view, based on wider field work, may well involve some re-statement.

What is clearly apparent is the need for research into the diversity of material in Scotland. While the group-farms and the associated clachans were once universal, house types varied. It is but reasonable to suppose that, with geographical distinctions as acute as those between Lowlands, Highlands and North-West, and with languages as different as Lowland Scots and Gaelic, the country as a whole cannot be considered as a simple unit from the point of view of folk life.

- ¹ Mrs E. M. C. Stewart, Tempar, Kinnoull, Perth, has examined many sites in the course of her archaeological field studies in Perthshire; her help and guidance are most gratefully acknowledged.
- ² Walton, J. Cruck-Framed Buildings in Scotland, *Gwerin*, 1957, Vol. 1, p. 109.
- ³ Sinclair, Colin. *The Thatched Houses of the Old Highlands*, 1953.
- ⁴ Sinclair, *op.cit.* p. 40.
- ⁵ Thomas, Capt. F. L. W. On the Primitive Dwellings and Hypogea of the Outer Hebrides. *Proc. Soc. Antiqs. Scot.* 1866-8, Vol. 111, p. 153 and especially Plate XXX.
- ⁶ See Kissling, W. The Character and Purpose of the Hebridean "Black House", *J. Roy. Anthropol. Inst.* 1943, Vol. LXXIII and House Traditions in the Outer Hebrides, *Man*, 1944, p. 114.
- ⁷ Evans, E. Estyn. "The Ecology of Peasant Life in Western Europe" p. 229 in *Man's Role in Changing the Face of the Earth*, edited by Thomas, W. L., 1956. See also Evans, E. Estyn Some Survivals of the Irish Open-field System, *Geography*, 1939, Vol. 24, p. 24, where, however, he is primarily concerned with the "township".
- ⁸ Proudfoot, B. Clachans in Ireland, *Gwerin*, 1959, Vol. 2, p. 110.
- ⁹ This is abundantly clear from many references in the *Old Statistical Account of Scotland*. See also, Ferguson, T.: *The Dawn of Scottish Social Welfare*, 1948; Handley, J. E.: *Scottish Farming in the Eighteenth Century*, 1956; Graham, H. G.: *The Social Life of Scotland in the Eighteenth Century*, 1909.
- ¹⁰ Third, B. M. W. The Significance of Scottish Estate Plans and Associated Documents, *Scottish Studies*, 1957, Vol. 1.
Lebon, J. H. C. The Process of Enclosures in the Western Lowlands, *S.G.M.*, 1946, 62 (3); 100-110.
- ¹¹ Gray, Malcolm: *The Highland Economy, 1750-1850*, 1957.
- ¹² A detailed description was given personally by Mr MacNee, The Guest House, Killin, Perthshire.
- ¹³ Grant, I. C. *The Social and Economic Development of Scotland before 1603*, 1930, pp. 96 ss.
- ¹⁴ Fairhurst, H.: "Western Scotland" contributed in a symposium, edited by Evans, E. Estyn, *Rural Settlement in Ireland and Western Britain. The Advancement of Science*, 1959, No. 60.
- ¹⁵ Curwen, E. C.: The Hebrides: a cultural backwater, *Antiquity*, 1938, Vol. 12, photograph on Plate III by Crawford, O. G. S.
- ¹⁶ Quoted in Mason, J. Conditions in the Highlands after the Forty-Five, *Scot. Hist. Rev.* 1947, Vol. XXVI and referring to Forfeited Estate Papers: General Management, *Factors' Report, 1755*, p. 194, in the Register House, Edinburgh.
- ¹⁷ Boswell, James *A Journal of a Tour to the Hebrides with Samuel Johnson, LL.D.*, 1785, see under the entry for 31st August.
- ¹⁸ Mason, J. *op. cit.* Valuable material on West Perthshire occurs in Gillies, W. A. *In Famed Breadalbane*, 1938.

GEOGRAPHICAL REFLECTIONS ON MODERN MAPPING

D. R. MACGREGOR

There is a strong likelihood that future generations of cartographers will look back on the mid-twentieth century as a period of unusual and important progress, and it may well be claimed that mapping has made greater advances in the last twenty years than in any previous period of similar duration. Such advances have resulted not only in a greatly extended areal coverage, but have yielded maps of increased accuracy and of remarkable attractiveness covering an unprecedented range of topics. Progress has in fact been made on a wide front, and the accomplishments to date in topographic and systematic mapping indicate that cartographic science has gained a momentum that will not readily slacken for some considerable time to come.

The situation is one that should intimately concern all geographers on account of the changes involved and the opportunities offered. By its very nature, the study of geography is inevitably associated with the drawing and study of maps, but geographical investigation and writing has in general advanced faster than mapping; thus there are fairly numerous instances of geographical findings and conceptions that have still to be effectively mapped. This is not to belittle the great effort made by geographers in recent years to develop the mapping technique, an effort that in aggregate amounts to a major success, but it may be suggested that many geographers are too much aware of the limitations of mapping and too little acquainted with its current achievements and future possibilities. The cartographic record of the past twenty years does in fact show that remarkable changes can be made and unforeseen standards achieved. It is apparent that cartographic weaknesses should not be regarded as inherent defects that cannot be remedied or modified, nor should it be imagined that improvements are likely to be limited to some particular sphere; they are just as likely to take place in economic and social mapping as in the mapping of topography and geomorphology. In short, developments in mapping are liable to concern all geographers. It is therefore the aim of this article to note some of the more important trends in modern mapping, and to suggest how they may have a bearing on the study of geography.

The modern topographic map is notable for its improved accuracy, its extended content and its enhanced artistry. The improved accuracy stems from more precise ground-survey, from the employment of aerial photogrammetric techniques, and from precision scribing on a plastic or glass base in place of drafting with pen on paper. These techniques will not always (or even commonly) be found in full combination, for while the French *Institut Géographique National* employs aerial photogrammetry in full measure (flying its own aircraft and operating more than one hundred first- and second-order plotting instruments), it continues to draw its maps in ink on cartridge paper which is mounted on a metal base. The British Ordnance Survey, which until about three years ago adhered mainly to ground-survey methods, is now making extensive use of aerial survey and has developed analytical triangulation

as a solution to the problem of accurately and economically establishing a network of ground-control points; ground survey is still employed, however, along with aerial survey in the production of 1:1,250 and 1:2,500 plans, and wherever possible use is made of modern ground-instruments like the tellurometer and tacheometer; final map-drawings are made by means of scribing. In Switzerland, where the terrain differs markedly from Britain, ground and aerial survey, and scribing and freehand drawing are all employed in combination.

Improved accuracy in topographic maps is due more to aerial photogrammetry than to any other single factor, for it means that even the smallest detail may be positioned on a map with great accuracy; so great in fact is this accuracy, that at scales between 1:10,000 and 1:100,000 inaccuracy exists only in the size of the symbol drawn, not in its positioning. The most telling tribute to photogrammetric map-making is the selection by the French of 1:20,000 as their basic survey scale, modern methods permitting them to enlarge up to 1:10,000 with complete confidence. In quite another sense accuracy has been and is being improved, in that new and better symbols present a more realistic impression of the physical landscape, but since this is closely related both to content and the quality of artistry, it will be discussed later.

There are probably not many map-users who fully appreciate the growing content of modern topographic maps. The introduction into Ordnance Survey maps of power lines, automobile-association kiosks and National Trust areas is commonly recognised, but this is only the beginning of the story. The O.S. *One-Inch Map* today carries just over ninety separate conventional signs, whereas in the old *Popular Edition* approximately only fifty were used; the Americans at present at the same scale employ just over one hundred and the Swiss nearly one hundred and twenty. The most astonishing figure is, however, that of approximately three hundred symbols on the French 1:20,000 series; by comparison the British 1:25,000 falls a long way behind with only eighty-eight. The increasing content of continental maps concerns physical and cultural aspects alike, and whilst it has been made possible by the use of photogrammetry together with improved drafting and printing techniques, it also results in part from growing professional pride amongst cartographers and intelligent and encouraging representation by map-users in general. It is a significant fact that this trend can continue yet some way by means of scale adjustment, the use of new symbols and still better printing, and it is clear that British *One-Inch* maps are at a distinct disadvantage as compared with continental maps in this matter of content, for the enlargement of any O.S. sheet from 1:63,360 to 1:50,000 reveals a measure of opportunity that may in future years be grasped with real advantage. The publication of the new *Quarter-Inch Map* at 1:250,000 in place of 1:253,440 is interesting in this context, since it marks a step away from rigid adherence to British statutory scales, a previous departure being the 1:25,000 scale.

That modern topographic maps can carry more information and yet remain clear and legible is due in large part to their artistry, this quality being derived in turn from technical improvements in both drawing and printing, and from remarkable skill on the part of map designers and cartographic artists. In consequence maps are now appearing which are

probably more attractive than any yet produced in the whole history of cartography, and as outstanding examples one would quickly quote the Swiss *Landeskarte* and the new O.S. *Tourist Edition*. It is interesting to note that these modern maps are to be respected not merely for their appearance, but also for the craftsmanship that goes into the making of them: the distinctly 'flat' maps that result from the exclusive use of contour lines have been found wanting, and the cartographic skill that was so important in engraved maps of the eighteenth and nineteenth centuries has once again resumed its place in the scientific art of map production. A map is a medium seeking to transmit information, and in growing measure the success of transmission depends upon the cartographic artist; he it is who is presented with the surveyed facts, with the appropriate aerial photographs and in some cases with a relief model, and who from these must create a representation that is both accurate and realistic. The device of prime importance in this respect is undoubtedly hill-shading which was used without much success by various map-makers prior to 1939, but which is now fast becoming accepted as an essential component of any satisfactory topographic map. Applied precisely with due regard for height and slope, and printed in tones that ensure the retention of clarity, hill-shading has assumed a new and significant cartographic value. The Swiss have used it most effectively to depict mountain topography, the French have illustrated how it may be used in lowland areas (with particular success for the incised meanders of the River Seine), and the Ordnance Survey has shown how well it can be combined with contouring and layering.

It is thus apparent that the mid-century geographer is being presented with topographic maps of high quality, and it is certainly desirable that the value of these maps should be fully appreciated. Only thorough acquaintance with such maps will reveal their value as a teaching and study aid, and without such acquaintance users are in no position to offer critical, constructive comment which constitutes an important avenue to further improvement. Now let us consider how improved topographic maps are likely to concern geographers.

Greater accuracy is probably of particular concern to the geomorphologist, who may now be presented with a remarkably accurate pattern of contour lines. Scottish geographers are well aware of the approximations of highland contouring, but French and Swiss geographers are already accustomed to working with precise contour patterns, since photogrammetry enables contour lines to be located accurately at one-inch and two-and-a-half-inch scales. The modern trend is not, however, toward sole reliance upon improved contouring, but is in fact quite the reverse, for many modern topographic maps incorporate not only hill-shading, but also make a selective portrayal of rock faces, scree, gullies, terraces, moraines, drumlins, outwash fans, depressions and sink-holes. Better printing yielding greater clarity has also worked toward greater accuracy, for with symbols being drawn more finely and more nearly to scale, generalisation has been correspondingly reduced; American as well as Dutch and Swiss maps reveal this trend toward finer drawing. This permits much additional detail to be included in any map, and many geographers are bound to be intrigued by the

mounting range of available information concerning land use, landscape and industry.

The content of topographic maps produced by different nations differs to quite a degree, but comparison of the different publications is chiefly of interest because of the possibilities that are revealed. Despite the fact that all the merits of all the different topographic maps cannot be combined in one map, and despite map-content being greater than ever before, it seems plain that the climax has not yet been reached. Swiss maps give more information about relief than any others, French maps are particularly strong in the representation of land use and field patterns, and American maps give considerable attention to communications; thus each map might borrow ideas from others (which is indeed happening) with a resulting increase in content.

The consequences of the trend toward greater content are considerable in their effect. Large-scale maps such as the French 1 : 20,000 series are becoming extraordinarily informative documents from which a concise and realistic conception of any landscape can be formed, although by contrast the British 1 : 25,000 map is a relatively crude instrument which fails to realise the potential value of such a scale. The contrast is probably due to the extensive use of aerial photographs by continental map-makers and the employment of geographers in map making. The use of such informative maps requires a high standard of map reading, higher in fact than that accepted of many geography students and graduates today, for the modern topographic map is employing an increasingly complicated code with which a map reader must become easily conversant, and to obtain satisfactory results the student must also master the technique of creating from the map-plan a three-dimensional view in the mind in both detail and colour. The growing content of continental topographic maps also suggests that British geographers might profitably start a critical examination of the empty spaces appearing on the O.S. 1 : 10,500 and 1 : 25,000 series. Information concerning the character of streams, the extent of floodable land, types of vegetation and the nature of industrial premises might all be improved, and would it not be practicable and valuable to show land classification on the *Six-Inch Map*?

The artistry of the modern map takes several possible forms and yields a number of beneficial results. The use of attractive, pastel tints as in the case of British and Swiss maps is quite different from the precise line-work that characterises French and American maps, but both techniques make the respective maps clear and attractive, and these qualities are perhaps of greater importance today than ever before in encouraging the reader to master what may be a rather complicated document. Hill-shading is a device which also adds enormously to the attractiveness of a map, but there is of course much more to hill-shading than plain artistic value. It is a device which can reveal structural and physical patterns with great clarity as in the French *Atlas of Relief Forms*, and in more detail it draws attention to slope which generally receives too little study in geographical map work.

The modern topographic map is thus for the geographer a tool of growing efficiency. Its great accuracy and considerable content make it worthy of careful study, and its three-dimensional view helps to create

a live, visual impression of the landscape, which is what every good topographic map should do. To assess the validity of the comments made thus far, no reader can do better than study a sheet of the Swiss *Landeskarte* at either the 1:50,000 or 1:100,000 scale.

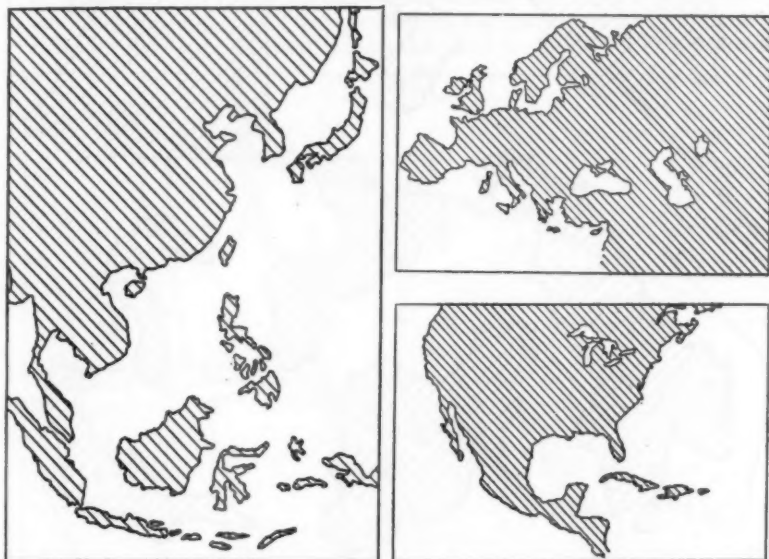


Fig. 1. The three adjacent maps represent atlas sheets showing Europe, part of North America and part of Asia. Readers are invited to decide whether these three maps are similarly or variously scaled. *The solution is given on page 107.*

In quite another realm of mapping the mid-twentieth century geographer is fortunate, for an ever-widening range of atlases is available for his use. These comprise many reference atlases in different styles, a growing company of very valuable national atlases, and a lesser group of special atlases concerned, as yet, more with economic and human than with physical matters; the national atlases contain in aggregate practically all the arts and techniques of the cartographer's trade. But despite this great wealth of material, there are certain grounds for concern relating both to the atlases themselves and to the use of them by geographers.

Consider first the variety of scales that appears in many atlases. Such variety exists of course to allow maps to be conveniently fitted into available page space, and if one criticises the use of many different scales, it can be argued that scale is a device to be used freely by the cartographer; furthermore scale will always be stated for any reader to see. Yet modern atlases are frequently using such a variety of scales as to create confusion of areal values. The author has been intrigued to find that many advanced students of geography have a deplorably weak grasp of fundamentally important areas and distances, and when a quarter-page map of Britain is accepted as being on par with a full page map of Africa, the scales being respectively 1:20 million and 1:40 million, there is clearly something wrong. The reader may care to

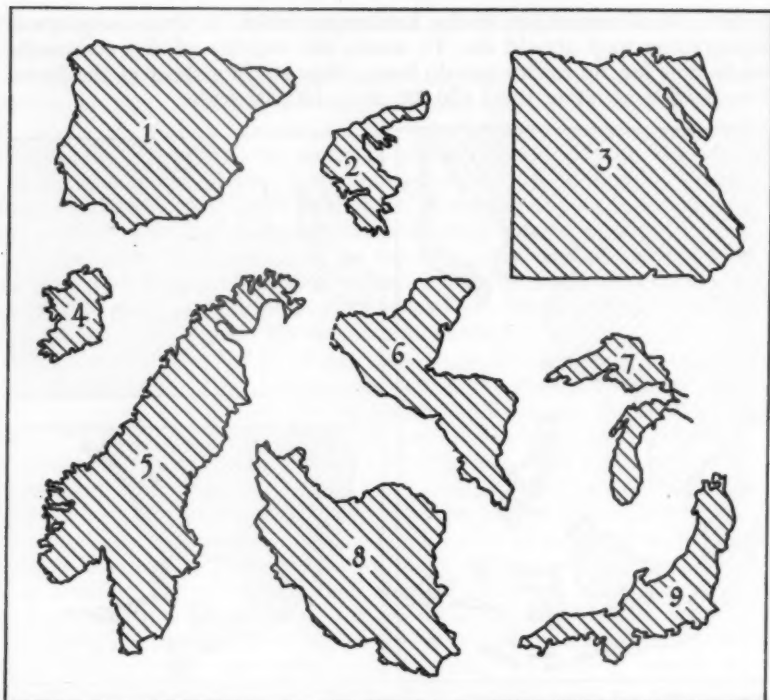


Fig. 2. The areas shown above are (1) Iberia, (2) Greece, (3) Egypt, (4) Ireland, (5) Scandinavia, (6) Central America, (7) Great Lakes, (8) Persia, (9) Honshu. Readers are invited to identify those areas drawn to a scale that is larger or smaller than that of the majority. *The solution is given on page 107.*

consider (without recourse to map or gazetteer) how the areas of Arabia, Greenland and India compare, and again Figures 1 and 2 may be studied as another test of recognition of comparable areas.

Geographers and cartographers can remedy a weakness of this sort in several ways. It can first of all be countered by precise teaching, especially perhaps at senior-school level, and secondly geographers might insist upon a more prominent display of scale on all small-scale maps; there was real merit in the old device of showing an inset map of the home country on all small-scale maps of foreign lands. Thirdly cartographers might consider the desirability of maintaining more discipline in their handling of scale. It is unlikely that any such discipline would seriously handicap the cartographer, for it is clear that the choice of any very particular scale may yield no special advantage: there is little difference in detail of relief between a map at 1:40 million and another at 1:25 million, and maps of 1:20 million and 1:10 million may also be classed together in the sense that they can successfully portray only first-order relief features; thereafter one must drop to 1:5 million to obtain a clear picture of second-order features, and then to 1:1 million to represent lesser ridges and scarps. Here then we have the outline of

a possible scale-classification, regard for which might reduce the number of scales and the resulting confusion in any single atlas.

Projections too play their part in confusing a student's grasp of area. Again more precise teaching and clearer identification is desirable, but in addition one would strongly recommend the simple expedient of studying the pattern of the projection. Far too many geographers are ridiculously afraid of map projections, and it should be clearly appre-

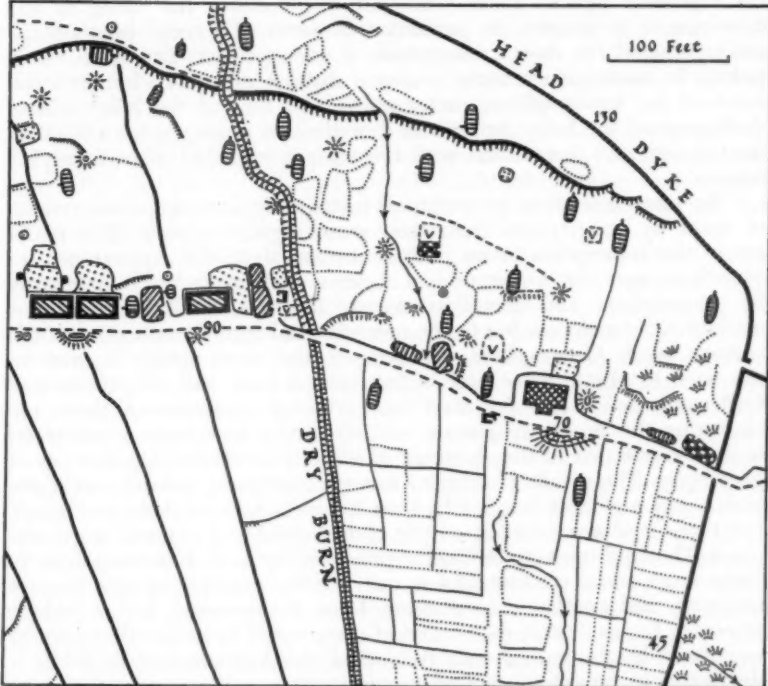


Fig. 3. Excerpt from plan of St Kilda Village. Plan includes spot heights, escarpment, boundaries of old cultivations plots and later field-strips, garden enclosures, building vestiges, and buildings of different types and different periods. The plan as a whole was prepared for the National Trust for Scotland.

ciated that much can be achieved by comparing any map graticule with the global pattern. It might also be suggested that cartographers should present projection reliability diagrams along with small-scale maps of large areas.

One of the greatest advantages held by the modern geographer lies in the availability of national atlases. These provide a wealth of information with which university geographers are generally acquainted, but it is questionable whether such information is used to full advantage. It is obviously valuable as supporting evidence in regional study, but it also exists as a ready-made basis for methodological training. Nowhere better can one find maps of different subjects, similarly scaled and projected, presenting a host of comparable and contrasting distributional patterns: in noting the patterns, in measuring different degrees of

relatedness, and in searching for causal factors, we surely have the essence of modern geography. Can we be confident today that these rich resources are being used to full advantage?

During the last thirty years geographers have contributed in ever growing degree to the development of mapping techniques. The maps produced by geographers concern every possible aspect of the land and of man's occupance of it, and this contribution in itself is surely a powerful argument against those who still doubt either the value or the existence of geography. In particular, however, the geographer's maps are significant for their presentation of unnoted facts and fresh viewpoints. In consequence there is now a distinct difference between the work of the topographical cartographer and that of the geographical cartographer, the latter being best described as a geographer skilled in map design and acquainted with the various branches of cartographic science.

The latest feature of geographical cartography is perhaps the making of maps by geographers from their own original surveys. This really marks the resumption of an interest rather than the appearance of something new, for topographical surveys were made quite frequently by geographers and travellers during the nineteenth century: the marked difference now lies in the precision and special application of the surveys made. Geographers are taking to this work simply because of the need to obtain more precise facts about land, soil, vegetation and settlement, and it has followed that growing numbers of them are mastering the necessary ground and air-survey techniques: this trend is clearly revealed in the curricula of various university departments of geography. The results of original surveys combining ground and photo techniques are most frequently seen today in geomorphological maps, but there is also a growing output of historical and cultural maps and plans. The land-use map of Cyprus produced by R. R. Rawson and K. R. Sealy from aerial photographs is one notable example of this type of mapping, and another excerpt example on a very much larger scale is shown in Figure 3; this shows part of a survey of St Kilda village which was made by the author with the aid of theodolite and plane table. A distinctive feature of specialised geographical surveying is that the scales used are often very large; St Kilda village was mapped at 1 : 1,000, and geomorphologists even now are engaged in recording frost and soil patterns at scales as large as 1 : 50 ! Work of this character, whatever the subject, can only be carried out by the trained specialist who also possesses a knowledge of surveying and mapping methods: it is significant primarily for its introduction of new standards of precision into the measurement and evaluation of geographical patterns.

In conclusion it may therefore be suggested that students of geography must receive a fair measure of cartographic training if they are to use modern maps efficiently. Such training will also enable them to engage in various branches of map making, thereby ensuring that the initiative in cartography is not yielded entirely to the specialist cartographer; if this were to happen geography and cartography would both be the poorer. In another sense cartographic experience is vital to the geographer, for the map is more than 'the symbol of geographic science'; it is also the safeguard setting forth for examination the element of space and focussing the attention of the geographer upon that element.

JOHN GEORGE BARTHOLOMEW

A CENTENARY

DOUGLAS A. ALLAN, C.B.E.

Scotland has a long and distinguished tradition in the making of maps, as is evidenced by such illustrious names as Timothy Pont, Gordon, Adair, Ainslie, Lizars, Lothian, Johnston, Kirkwood, Thomson and Bartholomew. John Ogilvie and George Philip are another two Scottish cartographers, who spent most of their working lives south of the Border. At the beginning of the nineteenth century, Edinburgh was very much the centre of Scottish printing, and probably on that account map-making and map-publishing became a notable activity of the Capital and have remained so ever since.

In March 1960, it was appropriate to look back with interest on a cartographic centenary, for on the 22nd of March, 1860, there was born in Edinburgh John George Bartholomew. Although his family had for three generations established its name in the devising and production of maps, this young man was destined to play a very noteworthy part in raising the standards and increasing the public appreciation of not only cartography but also geography, to which maps are so essential. The earliest association of the name Bartholomew with map-making was with George Bartholomew (1784-1871) who, at the age of thirteen, started his apprenticeship as a map engraver with the Edinburgh firm of W. & D. Lizars. John Bartholomew (1805-1861) followed in his father's footsteps and ultimately set up his own engraving business, into which he brought his son in turn, another John (1831-1893), first as a trainee and later as a partner when, in 1860, the new business title of John Bartholomew & Son was created, with offices at 4A North Bridge and the printing works round the corner in Carrubber's Close. In 1870 the business premises were removed to 17 Brown Square, where the Dental College now stands. From there the next removal was to 31 Chambers Street in 1879, where, shortly after, John George (1860-1920) following an education at the Royal High School and the University of Edinburgh, joined his father in the trade that had by that time become a family tradition. In less than ten years, in 1888, at the early age of twenty-eight, he succeeded his father in the entire management of the business, and a year later moved his charge to Park Road and named it "The Edinburgh Geographical Institute".

From 1888, John George was in partnership with Thomas Nelson, until the latter died in 1892, and from 1893 until 1919 his cousin Andrew G. Scott was his partner and financial adviser. During the period of these two partnerships the firm was known as John Bartholomew and Co., but in 1919 it was registered as a private limited company, with the title so widely known today — John Bartholomew & Son Ltd. In 1911, a move was made to an entirely new building in Duncan Street, employing as its imposing facade the front of John George Bartholomew's residence, Falcon Hall.

John George Bartholomew was a man of wide erudition and he

initiated and carried forward projects of considerable magnitude. In 1895 *The Survey Atlas of Scotland*, uniting in one whole the sectional sheets on the scale of half an inch to the mile, which had achieved wide popularity and which had, since 1883, used layer-colouring to indicate altitude — a novelty first introduced in 1880, at his own suggestion, in the topographical maps included in Baddeley's *Guide to the English Lake District*. These half-inch maps thus had the distinction of being the first topographical series in any country to make use of the layer-coloured system, now so generally accepted. The year 1898 saw the appearance of *The Citizens' Atlas*, a large reference atlas of the world that long enjoyed a justly earned popularity in all kinds of settings.

In 1899 there appeared the first volume of the most important project ever planned by the Institute — a physical atlas on a scale of unparalleled magnitude. It was *The Atlas of Meteorology*, designed to be the third volume of a series of seven. The first volume was to deal with the extent of land and sea surveys, leading on to geological surveys; the second to orography, hydrography and oceanography; the fourth to botany, the fifth to zoology, the sixth to ethnography and the seventh to general cosmography. Although only two of the volumes were completed, (the second was *The Atlas of Zoogeography* in 1911) they gained world-wide recognition for their size, clarity, detail and artistry and were noteworthy for the many new features introduced under the stimulus of J. G. Bartholomew and the team of experts he gathered around him. Some of the maps specially designed for this series were subsequently incorporated in other text-books and atlases. One of his productions for schools, *The Comparative Atlas*, is still enjoying popularity sixty years after its appearance and has nearly achieved the two million copies mark.

An expanded edition of *The Survey Gazetteer of the British Isles* followed in 1904. As well as the large-scale maps, these atlases contained smaller-scale variants illustrating geology and meteorology, and included some showing density of population — another novelty now regarded as a necessity. Up-to-date examples of them were specially prepared by Bartholomew, for reproduction in *The Scottish Geographical Magazine*, incorporating the results of the censuses of 1901 and 1911 in Scotland. Other notable publications were *The Survey Atlas of England and Wales* in 1903, *The Atlas of the World's Commerce* in 1907, employing material accumulated for Vol. VI of the major series, *The Imperial Atlas of India* in 1909 and *The Historical Atlas of the Holy Land* in 1915. From him came also the superb maps and charts for Sir John Murray's famous *Bathymetrical Survey of Scottish Freshwater Lochs*. His latest work, in 1920, was the preparation of nearly all the plates for the monumental *The Times Survey Atlas of the World*, published in 1922 and a standard work for a generation or more.

Outside the Geographical Institute, J. G. Bartholomew's enthusiasm found yet other causes to espouse, and one of the first and naturally near to his heart was the founding of the Royal Scottish Geographical Society in 1884. He was one of its most active protagonists and did yeoman service in overcoming the many and far from insignificant difficulties that beset the path of the pioneers. From its inception until his death, he was one of its honorary secretaries, and he contributed both maps and

Royal Scottish Geographical Society

THE ANNUAL BUSINESS MEETING

WILL BE HELD IN THE SOCIETY'S ROOMS, SYNOD HALL, CASTLE
TERRACE, EDINBURGH, on Thursday, 20th October 1960, at 3.30 P.M.

BUSINESS

1. Report of Council for Session 1959 - 60.
2. Financial Report 1959 - 60.
3. Election of Council and Office-Bearers for 1960 - 61.

The Council recommend that the following be elected as:—

(a) a Vice-President:
Erik Schacke

(b) Vice-Presidents serving on Council:

J. Cameron Smail
Douglas Guthrie
Arthur W. Russell
Alexander Harrison

John Johnston
Miss I. W. Hutchison
Douglas A. Allan
J. G. Harley

(c) Members of Council:

Alexander Douglas
Robert Inglis
Robert Kerr
Ian Kinniburgh
Mrs. A. F. C. Lamont
Mrs. K. L. MacGillivray

Sidney M. T. Newman
J. E. Richey
C. J. Robertson
A. Graham Service
George A. Watt

(d) Chairmen of Branches:

Glasgow: J. Allan Bremner
Dundee: Miss I. A. Tyrie
Aberdeen: Miss E. F. Currie

(e) Auditor: Gordon G. Ruffle, C.A.

(f) Other Office Bearers: All those who are eligible for re-election to
be re-appointed to their offices.

BRIAN K. D. ROBERTSON,
Secretary.

SYNOD HALL, EDINBURGH, I.

1st September, 1960.

Royal Society of Medicine

The following abstracts are taken from the Journal of the Royal Society of Medicine, Vol. 10, No. 1, 1917.

THE EFFECT OF VITAMIN DEFICIENCY ON THE GROWTH OF THE RAT.
By J. H. M. VAN SOEST, D. VAN SOEST, and J. VAN SOEST.
From the Department of Physiology, University of Amsterdam, The Netherlands.

The effect of a diet deficient in vitamins on the growth of the rat was studied. The results show that a diet deficient in vitamins leads to a marked retardation of growth. The effect is more pronounced when the diet is deficient in both vitamins A and B than when it is deficient in only one of them. The effect is also more pronounced when the diet is deficient in both vitamins A and B than when it is deficient in only one of them.

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The effect of a diet deficient in vitamins on the growth of the rat was studied. The results show that a diet deficient in vitamins leads to a marked retardation of growth. The effect is more pronounced when the diet is deficient in both vitamins A and B than when it is deficient in only one of them. The effect is also more pronounced when the diet is deficient in both vitamins A and B than when it is deficient in only one of them.

articles to its magazine. His was the driving force behind the fine production of the Edinburgh number produced in 1919.¹ He also took a leading part in the establishment of the first Lectureship in Geography at the University of Edinburgh, though he would have liked it to be a Chair, and was among its earliest and most generous benefactors, both to the post and to the equipment of the department which followed. His eminence in his subject and his devoted public work gained for him honorary membership and medals of a variety of geographical societies, both at home and abroad, and in 1909 his old university bestowed upon him the honorary degree of LL.D. For the leading part he played in placing cartography in this country on a thoroughly scientific basis, and his distinguished services to geography, he was appointed Geographer and Cartographer to H.M. King George V.

In his later years he had to maintain a continuous battle with ill health and it was not an uncommon thing for him to send invaluable advice to the Society's council from his sick bed. It may have solaced him a little that in his search for better health he embarked on travels which gave him glimpses of the other lands he had known so intimately, but from maps only. On one of those trips, to Portugal, he died at Cintra, in 1920.

From the end of World War I, in which he served with distinction and gained the M.C., John Bartholomew (1890-), the eldest son, took over the management of the business, and to his aid as the years passed came three of his sons, the eldest appropriately bearing the family name of John. To John Bartholomew M.C., fell the task, among others, of editing the second edition of *The Times Atlas of the World* in five volumes between 1955 and 1960. On the other hand, he has had to cater for an entirely new generation of map users—motoring and travel organisations, shipping companies, air lines and Youth Hostel Associations. He has seen produced *The British Isles Pocket Atlas* 1918, *The London Pocket Atlas* 1922, *The World Pocket Atlas* 1923, *The Handy Reference Atlas* 1923, *The Graphic Atlas* 1932, *The Road Atlas of Great Britain* 1943, *The Compact Atlas* 1943, *The Regional Atlas* 1948, *The Columbus Atlas* 1953, *The Edinburgh World Atlas* 1954 and *The Roadmaster Atlas of Great Britain* 1958.

Again in the family tradition, he served as a Joint Honorary Secretary of the Royal Scottish Geographical Society from 1920 till 1950 and as its President from 1950 to 1954. Medals and honorary memberships, too, have inevitably come his way for devoted and far-sighted service, and Edinburgh University awarded him an honorary LL.D., in 1956. In 1960 he was appointed Commander of the Most Excellent Order of the British Empire. In turn, his son John C. Bartholomew is now one of the two Joint Honorary Secretaries of the Society, after war-service mapping in the Middle East. Service to the Society, in many forms, and generosity sometimes most carefully concealed, are the key-notes of the Bartholomew family, from fathers to sons.

This brief resumé on the extent and variety of the publications of the Bartholomew firm would be incomplete as a record of achievement without some reference to the advances made in methods and materials, in which, from the first, they have been among the pioneers. Early maps were produced from engraving on steel and copper plates. Then came

lithography and a variety of other work, ranging from cheque books to drawings for an early Forth bridge and Gladstone's election literature in 1880. By 1888 the work was exclusively cartographical and atlases were being issued in languages other than English—there were, in the nineteen-thirties, no less than six variants for India. Colour lithography followed, and then photo-lithography. Now the newest plastics serve as the basis of 'negatives' in map printing. Mechanisation has in its turn speeded up the processes, but speed has to be geared to secure the highest degree of accuracy. Lastly, the search for a paper which will retain its size and colour under the widest range of climatic vagaries is ever being prosecuted.

¹ S.G.M., 1919, Vol. XXXV, No. 8.

NOTICE

John Bartholomew, M.C., J.P., M.A., LL.D., F.R.S.E., F.R.S.G.S., F.R.G.S., was appointed *Commander of the Most Excellent Order of the British Empire* in the Queen's Birthday Honours List of 1960.

PL. 2. GENERAL WILLIAM ROY'S MILITARY SURVEY OF THE MAINLAND OF SCOTLAND: 1747-1755. PART OF SECTION No. 23 SHOWING BEN NEVIS-FORT WILLIAM AREA.

Overall section size, nine feet six inches by two feet six inches, in thirty panels; scale of original 1,000 yards : 1 inch; scale of photograph 1,500 yards : 1 inch. On original map various colours are used for *mountains* : varied tones of grey and pale buff; *woods* : black with dark green; *moorlands* : pale buff; *haughland* : pale green; *cultivated rigs* : pale buff with grey rigs; *rivers, burns and lochs* : blue-green with black outline; *towns and buildings* : red; *roads and tracks* : brown; *lettering* : black. Spelling by present-day standards is phonetic and confirms the presence of lowlanders on the survey.

Surveyed by compass traverse, the map was produced by pen and ink fair-drawing with water-colour brush-work on relief features to produce a hill-shading effect. An attempt was made to represent the form of the land and it will be noticed that, in addition to showing Ben Nevis very graphically, quite small benches are picked out in the glens. Most of the hills are viewed from directly above but in the extreme bottom-right of the photograph a group of hills is shown in oblique view. Perhaps because of the use of brush methods, rock drawing remains subdued.

The area shown is predominantly one of hill moorland. Sparse woodland occurs along some valley sides. Lower valley-floors (see Glen Nevis) show the characteristic 'patch-work' pattern indicating run-rig cultivation. Uncultivated, and presumably ill-drained haughland, as in Glen Tarbat and north of Ben Nevis, is represented by a symbol very similar to that used by the Ordnance Survey today for rough pasture.

The original map is housed in the Map Room, British Museum, London and this photograph is reproduced by kind permission of The Trustees, British Museum.



JOHN GEORGE BARTHOLOMEW, LL.D., F.R.S.E.
1860-1920

*From a portrait made in his early forties during his tenure of Office as Honorary
Secretary of the Royal Scottish Geographical Society.*

Plate 1.





The centre of Greenock : view over the oldest part of town. Centre of picture occupied by a public park on the site of the laird's house (Fig. 2) which stood here until about 1886. Ground north of the park falls steeply behind the line of trees to 25-foot raised beach on which the early town was built. The area of the first harbour (now filled in and used as a storing place) can be seen to right of the tower of the Municipal Buildings. The Albert Harbour can be seen top centre of the photograph. Between these harbours lies the site of a former shipbuilding yard, closed down during the inter-war depression period; at its inshore edge two new factories have been built to re-house local firms engaged in light engineering and coopering. Houses in left foreground date from about 1870 and are typical of the tenements of the district. Cleared area on the right suffered severe bombing in 1940 and is now being rebuilt on a comprehensive redevelopment basis which includes the rebuilding of the Central railway station. The area is still the chief commercial district of the three towns of Greenock, Port Glasgow and Gourock; it contains the main shopping centre, which lies parallel to the top left, the district telephone exchange, head offices of banks, the Chamber of Commerce offices, and the bus and railway stations.



GREENOCK

GROWTH AND CHANGE IN THE HARBOURS OF THE TOWN

IAN A. G. KINNIBURGH

The successful growth and development of any port depends on more than the mere fortunate accident of the geomorphology of its site; rather is it compounded from something of the physical background, together with the history, economics and technological condition of the country which that port serves. In the case of Greenock, its western position in the central industrial lowlands would appear to be advantageous for trading with Atlantic and trans-Atlantic states of to-day, but, in the days when Scotland's trade lay chiefly with the Baltic and North Sea lands, such a position had no advantage. Similarly, the presence of a narrow strip of raised beach, backed by steep protecting hills with adjacent, sheltered, deep water immediately off-shore, has always been an asset, but the very narrowness of the beach has curtailed expansion once the advantages of the site have come into play. The circumstance whereby Greenock's harbours lie at the deepest water near to Glasgow was sufficient to make the town an important port but the very fact that Glasgow had to depend on the port forced that city to create docks of her own, within the city boundaries, which have now all but replaced the harbours of Greenock. (See Plate 3).

In the earliest days, Greenock, in company with several other small clachans on the banks of the Firth of Clyde, depended on fishing—for herring and salmon—and fish-curing for a livelihood. As early as 1542 historians mention the row of turf huts at Greenock and the adjacent settlement of Carlsdyke where the herring 'busses' were drawn up on the shingle to unload their cargoes. About this time too, ships were coming in from the continent to take away cured fish, coarse woollen cloth and skins in exchange for timber, salt, wines, brandy and fine cloths. These goods were unloaded at Greenock, Carlsdyke and Newark (later to become Port Glasgow) and transferred to lighters which could make the passage to Glasgow. There was no harbour for this entrepôt trade and the larger ships merely lay in the roads off the villages while their cargoes were discharged.

The first harbour of Greenock, therefore, might be called the 'natural harbour'. The deep-water roadstead close to the raised beach at the point where the clotted river enters the deep, sheltered firth (Fig. 1). In more detail it will be seen from Figure 2 that the beach, west of the island of Inchgreen, followed a wide bay from the promontory at Garvel for two miles and that this bay was itself divided into two smaller bays. The Bay of St Lawrence lay to the east and the Bay of Quick (probably originally pronounced 'Wick') to the west. It was in one of these two little bays that the first attempts were made to modify the natural harbour. Small piers were built out, one at Carlsdyke, and the other near the delta of the West Burn, where the village of Greenock was growing up. This latter pier was only a jetty to enable the local laird to reach his

barge dry-shod. Greenock was created a Burgh of Barony in 1635, however, and that pier must have been extended by 1656 when Thomas Tucker, Cromwell's officer, wrote of the town, "At which place there is a mole or peere where vessells in stresse of weather may ride and shelter themselves. . . .". The pier at Cartsdyke too was growing in importance for in 1697 units of the Darien Scheme fleet set out from there while others sailed from Newark, further up the river. The signs of growth in trade were becoming evident and this was not only in respect of foreign trade for, twenty years earlier, Glasgow had been forced to buy out the Greenock 'Royal Fishery Company' which had secured a very successful monopoly over the lucrative fishing in the Clyde. The trend to the 'golden west' was beginning to be felt and Glasgow had, by this time, decided to build its own port. Fourteen acres of land had been purchased beside the old castle of Newark three miles east of Greenock for this purpose. The harbour had, in fact, come into existence by 1668 when the settlement of "Newport" was described as "an peir with some houssis and dykis". Greenock, now placed in an inferior position and anxious not to lose trade, applied for a harbour also. The first appeals, in 1700, were turned down but in 1707, the year of Union, the harbour was sanctioned and was in use by 1710, in time to join in the great expansion of trade with the former English colonies in North America. The new harbour was instantly put into service for landing fish to be cured or salted, packed and dispatched to the new markets.

The harbour itself, consisted of two enclosing arms built out from the old shore-line with an intervening pier, or 'Mid Quay', dividing the harbour into two basins. In addition to the trade already mentioned, it is interesting to note, at this early date, the close connection with the shipbuilding and ship-repairing industry which was at this time beginning to flourish also. In the eastern corner of the harbour there was a 'graving bank', or slip, on which ships could be beached, careened and repaired. Later there was a tar pot here and another in the west side of the harbour. Together, these facilities were the predecessors of a dry-dock which was built in the west side of the harbour in 1783.

With these facilities trade increased so rapidly that, by 1751, the harbour had to be modified by the building of "breistwarks" or breasts along the inner sides of the harbour. These extended the quays and for a time, the harbour proved adequate. Whale fishing was added to the local fisheries in 1752 and this is chiefly of interest due to the fact that larger vessels were required for this work and also for the growing trans-Atlantic traffic. No significant deepening of the Clyde had so far succeeded and the increase in size of ships meant that the harbours at Greenock and Port Glasgow accepted all the traffic. To cope with this, works were carried out in the harbour for deepening the draught, widening the quays and generally improving facilities.

Trade flourished up until 1773 when the American War of Independence broke out, but resumed again in 1783 when peace was declared. The town was, by 1792, a place of 14,299 people and the 'Tail o' the Bank' anchorage was described as the place which "experienced mariners prefer to any other harbour in the firth". By this time vessels with a total tonnage of 43,404 tons were coming in while the tonnage of outgoing ships was 34,111 tons. These figures do not include coasting

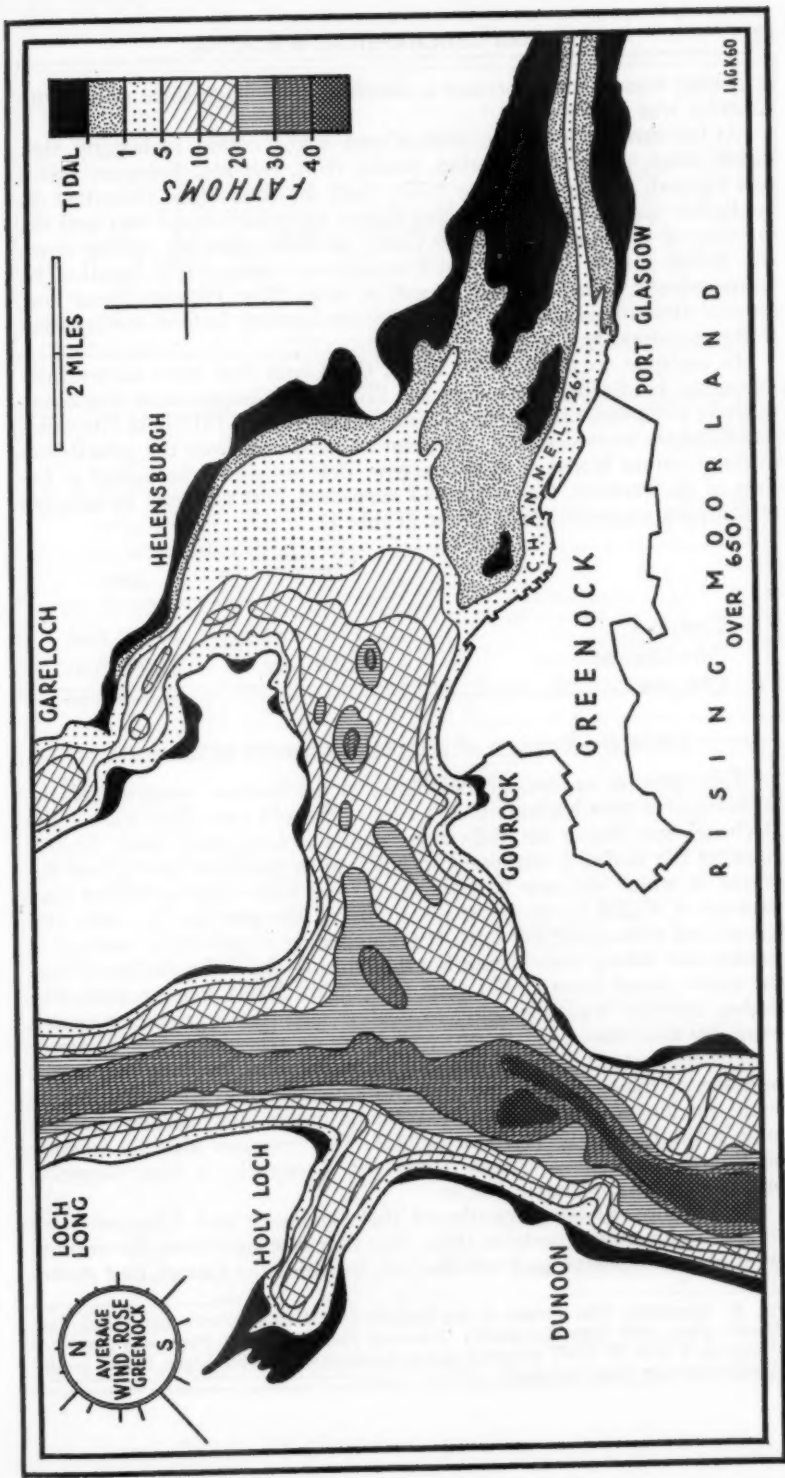


Fig. 1. Water approaches and natural anchorage at Greenock.

or fishing vessels and represent a doubling in tonnage since peace with America was declared.

At this time, imports consisted of rum, sugar, cotton, mahogany, rice, naval stores, potash, oil, timber, wines, fruit, salt etc. Tobacco, which had figured so largely before 1773, had by this time dwindled to negligible quantities. The leading export continued to be fish and the opening of the Forth and Clyde Canal, in 1790, although cutting down the Baltic timber imports which were now increasingly handled by Grangemouth, increased this export of fish. The Crinan Canal too, opened at the beginning of the nineteenth century, helped the coasting trade considerably.

In addition to these water lanes, the Clyde had been successfully deepened by Golborne—starting in 1770—and Glasgow was beginning to trade independently by the end of the century. In 1812 both Greenock and Glasgow were declared independent ports free from the jurisdiction of the Customs House of Port Glasgow. Before this, in the period at the turn of the century, Greenock had surpassed Port Glasgow in tonnage of shipping registered in the port (Table 1).

	1772	1810
Greenock	15,700 tons	40,000 tons
Port Glasgow	10,100 tons	13,100 tons
Glasgow	—	2,600 tons

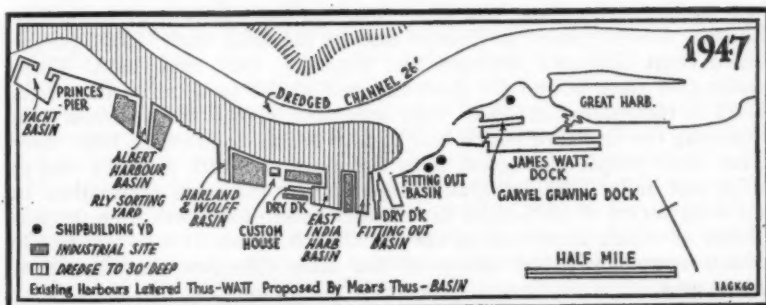
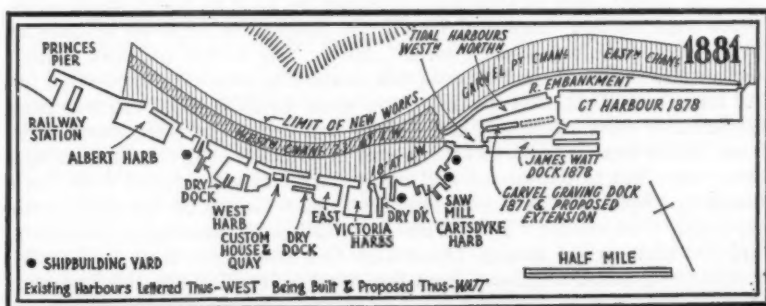
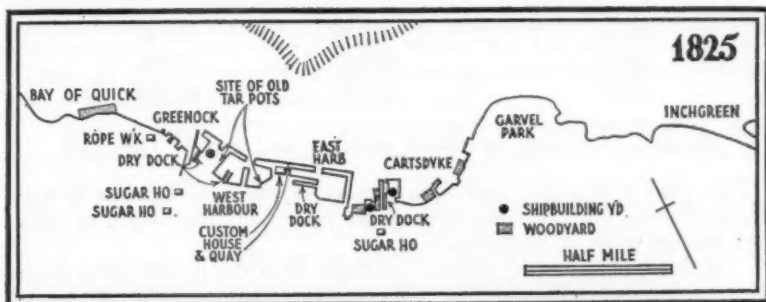
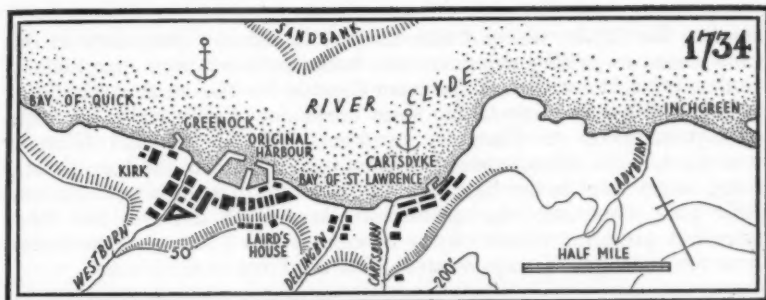
Table 1. Tonnage of shipping registered in the port.

This increase in tonnage belonging to the harbour necessitated the building of a new harbour to the east of the old one. This 'East India Harbour' was begun in 1805 and completed four years later. Vessels entering the harbour continued to increase in numbers throughout the period in which the new harbour was being built. During 1806 a total tonnage of 49,256 ocean-going ships entered the port but by 1810, this figure had risen to 60,936 tons. It is interesting to note that tonnage of coastal and fishing vessels entering the harbour showed a decline during the same period from 29,871 tons in 1806 to 24,654 tons in 1810. The fishing industry was beginning to decline and smaller coasting vessels were, by this time, able to proceed direct to Glasgow.

The interests of shipbuilders and repairers were not forgotten in the building of the new harbour. They now claimed that the old dry-dock could no longer meet their requirements and a new, larger one was built in the East India Harbour in 1818. This year saw also the erection of the magnificent Customs House at Greenock, a fine Georgian building in typical classical style.

It has already been mentioned that Greenock and Glasgow were created independent ports in 1812. This year was significant for another great change however as it was the year in which the *Comet*, first steam-

Fig. 2. (opposite) The growth of the harbour: 1734 from Watt's map; 1825 from Wood's plan; 1881 from Campbell's *Historical Sketches of the Town and Harbours of Greenock* Vol. II; 1947, proposals for redevelopment by Sir Frank Mears — this scheme has not been adopted.



ship on the Clyde, was put into service. Greenock's prosperity at this time rested on sailing ships and her trade included large quantities of timber brought by these ships from Canada for the local shipbuilding industry. Whereas large sailing ships could not readily tackle the difficult passage up to Glasgow, steamers could do so and Glasgow was quick to see the advantage of using tugs and steam dredgers to help bring larger ships to her harbours. In 1821, too, iron ships were successfully built. Greenock was approaching her zenith however and these were but gathering clouds on the horizon. Table 2 shows, nevertheless, how the tonnages of ships were fluctuating from year to year:

	Incoming	Outgoing
1810	60,936	58,943
1830	53,987	57,641
1835	72,932	69,558

Table 2. Tonnage of vessels entering and leaving Greenock.

In 1840 it was said that "the success of the river trustees in their improvements (*to the deepening of the river bed*) has begun to injure the foreign trade of Greenock".

At this time, however, imports of sugar from the British West Indies were increasing, although the tobacco import had virtually ceased—in 1838 there was only 1,120 lbs. Timber imports too were on the increase and the 16,000 loads of 1830 had increased by 1838 to 24,000 loads while 'deals and battens' imported rose from 304,000 in 1830 to 937,000 in 1838. This trade was chiefly with Canada. The textile industry, which had largely replaced the tobacco trade in the Glasgow area, accounted for the import of 10,411,933 lbs of 'cotton wool' in 1830. Coal too was now becoming a more important commodity and exports of this mineral rose from 12,644 tons in 1820, to 18,398 tons in 1838. In 1841 the first railway lines were laid to the quays and many harbours were fitted with coal-handling appliances as it was hoped to make Greenock the chief coal-exporting port on the Clyde. This hope failed to materialise, however, and the harbours of Irvine, Troon and Ardrossan kept their coal trade. A scheme to build a railway from the Ayrshire coalfield to the harbours at Greenock came to nothing.

In addition to these new cargoes coming and going in the port, a new traffic began about this time—this was the transport of emigrants. Largely due to unrest in Europe and in Scotland itself, 2,694 people sailed from Greenock between the years of 1821 and 1838. These passengers were bound for Australia and of the total, more than half, 1,632 in fact, sailed in 1838. This emigrant traffic to Australia was replacing the first flow which had been to North America. In 1821, more than 4,000 people had sailed from Greenock to North America and in 1831, just under 4,000 emigrants embarked for the same destination. In the total period of 1821-1838, the number bound for North America was 31,404 of which 15,430 sailed for the United States. It was this traffic which largely founded many of the later Glasgow passenger-liner companies.

By the middle of the century the town was booming with industrial activity, despite the threat of competition from Glasgow, and in 1846 another new harbour was begun; named the Victoria Harbour, it was completed in 1850. This harbour was built partially for trading purposes but also for fitting-out steam ships which were now being built in local yards. A berth on the east side was provided with a 75-ton crane for putting engines into ships and the harbour was made deep enough for ships to be 'engined' while afloat as there had been trouble on previous occasions in putting machinery into ships which were lying on the harbour bed. Much of the excavated material from the new harbour was dumped in the Bay of Quick where a pier, the Albert Pier, was created by the material. Shortly after this it was decided to extend facilities at this pier and to form another harbour, to be called the Albert Harbour. At the same time a passenger pier, known as Princes Pier, having direct rail connection with Glasgow, was built. The harbour was opened in 1867 and the pier in 1870. Previous passenger traffic for local piers had been handled at the Custom House Quay.

By this time it was possible to discern a specialisation arising in the trade of the town. Whereas in the early eighteen-fifties imports had "embraced a great variety of goods besides timber and sugar, such as guano, tar, hemp, flax, dried salted cod, fish oil, seal oil and skins", timber was perhaps now the chief commodity. Large rafts of logs were kept in ponds stretching as far up the river as Langbank and often the harbours themselves were full of logs which frequently impeded other traffic. By 1865 however, of 107 ships coming in, 76 were carrying sugar for the local refineries and the remainder were bringing in mostly timber. The harbours were still busy at this time but two years later, in 1867, the Kingston Dock was opened at Glasgow.

Shortly after this Greenock embarked on the biggest harbour building project of all. In an attempt to wrest supremacy of the Clyde from Glasgow, a huge project was initiated on the promontory lying between the old Bay of St Lawrence and Inchgreen. Here, in the grounds of Garvel House, a large wet-dock was built, a graving dock, and, in an area enclosed by the river embankment, a large area of water, known as the Great Harbour, was formed. The scheme was so ambitious that it was never fully completed and the present lay-out, which in fact brought the harbour authorities to financial ruin, is only part of the great scheme, as can be seen from the drawing of the proposed harbour in 1881 (Fig. 2). It was hoped that this dock project would attract passenger ships and the freight traffic which at the time was going to Glasgow. In 1870, when the plan was being proposed, the sugar imports had risen to more than 150,000 tons and there were high hopes that this traffic, from which the authority derived three-eighths of their dues at the time, would increase. In fact, following the import of beet sugar from the continent, the sugar industry was threatened with extinction until the international agreement was reached in 1902. The sugar import to-day is about 250,000 tons but even had that figure been attained earlier, as was hoped, it would never have been sufficient to finance the undertaking. Coaling cranes and coaling berths were a further feature of the new docks but the rail connection to the dockside was inadequate and the coal trade did not materialise. The water area of the huge new project

was seventy-three acres, or nearly seven times the area of the first harbour. Greenock had built this vast project only to find that shipping was already heading for Glasgow, a port nearer to the industrial heart of the country.

The picture since then has been one of steady decline of trade, broken only by moments of activity. The emigrant traffic, and the coaling trade dwindled away in face of better facilities elsewhere. The timber trade too disappeared leaving only the import of sugar. This has been the mainstay of the trade of the port ever since. The harbours have become more than ever associated with the shipbuilding industry. The James Watt Dock, and the Victoria have facilities for fitting-out and the Great Harbour has been pressed into service for this work also during the period of converting ships from coal to oil burning. The number of ships entering the harbours in 1939 was 7,487 but by 1957 this number had fallen to 4,970.

Despite this feeling of despondency there has been an underlying sense of re-awakening in the harbours since 1945 and it is hoped, by many townspeople, that the depths have been plumbed and that a new period is about to open. Since the war, several plans have been put forward for the rebuilding of the entire harbour installation. The Harbour Trust have put forward several ingenious schemes for the better organisation of their facilities and Sir Frank Mears, in his plan for the town, devoted considerable attention to the re-generation of the harbour (Fig. 2). Plans by themselves will not convince but there is factual evidence for optimism. Although the number of ships calling has fallen, there has been a rise in the total imports since before the war. This is due to the rise in the imports of the food-processing refineries in the town. The refining of sugar and of edible oils accounts for the main part of the imports of the harbours to-day and it is interesting to note that Mears suggested in his plan for the harbour, that food-processing industries would be the most suitable to attract to the industrial sites adjacent to the docks. During the past few months experiments have been taking place with the importation of bananas at the James Watt Dock, so that perhaps Mears' ideas are coming into practical application after all. Certainly modernisation has taken place in the handling of oil-seeds at the edible-oil refinery in the James Watt Dock and there too all sugar cargoes are being handled by the very latest appliances. Until 1958, sugar came to the port in jute bags and was man-handled at the deep-water berth at Princes Pier, but since February, 1958, sugar has been imported by bulk methods and is handled by specialised equipment at the James Watt Dock, where there are also large storage facilities, should the silos at the refineries in the town be full. Sugar can now be handled at the rate of 2,000 tons per working day (Fig. 3).

These are not the only signs of new developments in the harbours of the town. Although the Albert Harbour serves primarily as a laying-up berth for river steamers throughout the winter, and the Victoria Harbour and East India Harbour have seen most of their trade disappear, new schemes are in hand. The Admiralty have asked that space be reserved in the East India Harbour for the building of another graving dock alongside the present one. Another scheme is at present being financed to build a large graving dock at the east end of the Great Harbour. This

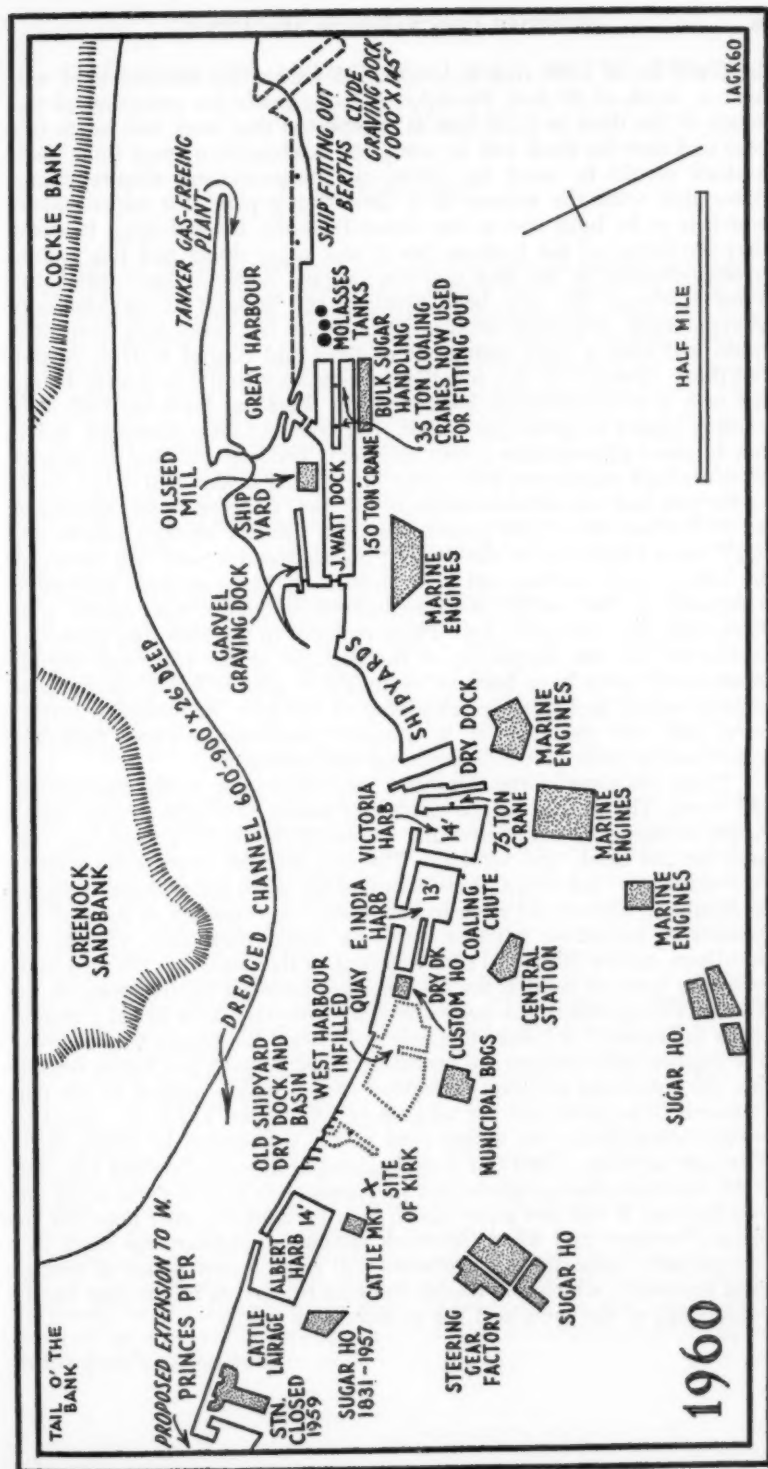


Fig. 3. The waterfront at Greenock to-day showing, in addition, situation of sugar houses and marine-engine works. Proposed site of new graving-dock indicated.

dock will be of 1,000 feet in length, 145 feet at the entrance and will have a depth of 50 feet. Provision is to be made for extension of the length of the dock to 1,150 feet. It is expected that work will begin this year and that the dock will be complete in about five years time. Such a dock would be used for fitting-out purposes and ship-repairing. Associated with the scheme is a de-sludging plant for super-tankers which is to be built also at the Great Harbour. By and large it seems that the future of the harbour lies in the larger docks and this feeling is strengthened by the fact that the original harbour, later called the West Harbour, has now been filled in and is used as an Admiralty storage dépôt. The other smaller harbours, as has been said, have little trade and only a little fitting-out of river and coastal craft is carried out there. Princes Pier has lost the river-steamer traffic in which, before the war, it was unrivalled. Here however there has been the revival of another aspect of passenger traffic. The trans-Atlantic passenger traffic has to some considerable extent returned. Tenders are used to embark or disembark passengers from large liners lying at the Tail o' the Bank, as the pier has not sufficient draught (20 feet) to accept liners alongside. In 1952 there were 2,253 passengers from Canada brought ashore and 1,237 were ferried out to the waiting liners. These figures had increased by 1958 to 8,421 landing and 5,681 embarking. Many of these passengers returning in this traffic are descendants of those who sailed from Greenock over 130 years ago. Plans in hand to develop this passenger traffic include the deepening of the draught of the pier, and already some small liners have berthed alongside. A plan is being discussed at present which includes the rebuilding of the pier, its extension further west and the erection of a modern passenger-terminal including considerable hotel accommodation on the waterfront.

These are some of the signs of a new awakening in the harbours of the town. The revival of the passenger traffic is a logical step and it might reasonably be expected that Greenock should be a passenger outpost for the Clyde and Scotland. The fact that the town is desperately in need of new industries (it recently had the worst unemployment figure in Scotland) also would seem to encourage the founding of some of the processing industries, whether they be food, chemicals, plastics, or fertilisers, on the industrial sites adjacent to the harbours. Perhaps however the greatest need is for co-operation between all the ports of the Clyde. This question has been raised by everyone from Royal Commissions to laymen but before one can understand the reason why many of the smaller undertakings are unwilling to participate, one has to remember the memories of years of jealous rivalry which existed in the past between these ports and the all-powerful Glasgow. There is a fear that co-operation means the taking over of the installation by Glasgow, or Glasgow interests. Until this is understood as a perfectly valid fear, and sufficient reassurances given that co-operation is for the good of all and not for one, it will not come easily. It is perhaps the only hope for the future however and when Greenock obtains an autonomous place in a co-operative authority, her harbours will enter a new phase of specialised prosperity which will enable the port to play its fullest part for the well-being of the town and the country as a whole.

SETTLEMENT AND POPULATION IN KINTYRE, 1750 - 1800

R. A. GAILEY

Highland estate papers have been a little-explored source for historical geography. For Lowland areas both Lebon¹ and Third² have published analyses of landscape change based on estate maps drawn up about the time of agricultural improvements. Other sources of information in collections of estate material are equally valuable, such as valuations and series of rentals. Recently, the author has been fortunate in being given access to a more unusual source: two censuses exist for the Duke of Argyll's estates in mainland and insular Argyll, dated 1779³ and 1792⁴. This short paper discusses the evidence given by these, and contemporary sources, for the distribution and structure of population and settlement in Kintyre during the latter part of the eighteenth century, and points to the important relationship between such sources and field evidence.

Before discussing the censuses it is necessary to examine the nature and extent of the Argyll Estates in Kintyre. A comparison of the Parliamentary Valuation of Argyll for 1751⁵ with the Military Survey of Scotland (more commonly known as Roy's Map)⁶ indicates the number and extent of estates in Kintyre at the mid-eighteenth century. Comparing the farm names in the censuses with those in the earlier sources it is clear that there was no significant areal alteration in the Argyll Estates between 1750 and 1800. Identification of the farm settlements presented few problems for 95 per cent of the names appearing in the 1751 Valuation and in the later censuses appear either on Roy's Map (approximately 80 per cent) or on the earlier editions of the Ordnance Survey six-inch map-sheets. The few remaining farms were located approximately from field and oral evidence, or by a process of intelligent guessing based on the fact that the farm names appear in the censuses (and in rentals) in a logical order when viewed in relation to the topography.

The farms of the Argyll Estates were concentrated in the southern half and along the west coast of Kintyre. The northern third of the peninsula, topographically more difficult and agriculturally less productive, is almost totally unrepresented. Thus the illustrations, Figures 1 and 2, refer to the central and southern portions of Kintyre. Arguing from the number of farms given in the 1751 Valuation, which appear under proprietors' and not tenants' names, the Duke of Argyll possessed half of Kintyre exactly while the next two largest estates, those of McMillan of Dunmore and MacDonald of Largy, could between them account for only 12 per cent of the peninsula. On the basis of the money valuation given the Duke possessed about 41 per cent of the total but since the actual basis on which the valuation was carried out is not clear, the number of farms probably gives a truer reflection of the real position, especially as the Duke's farms were concentrated on the more fertile areas of the west coast, the Laggan⁷ and Glen Breackerie and Conieglan in the Parish of Southend.

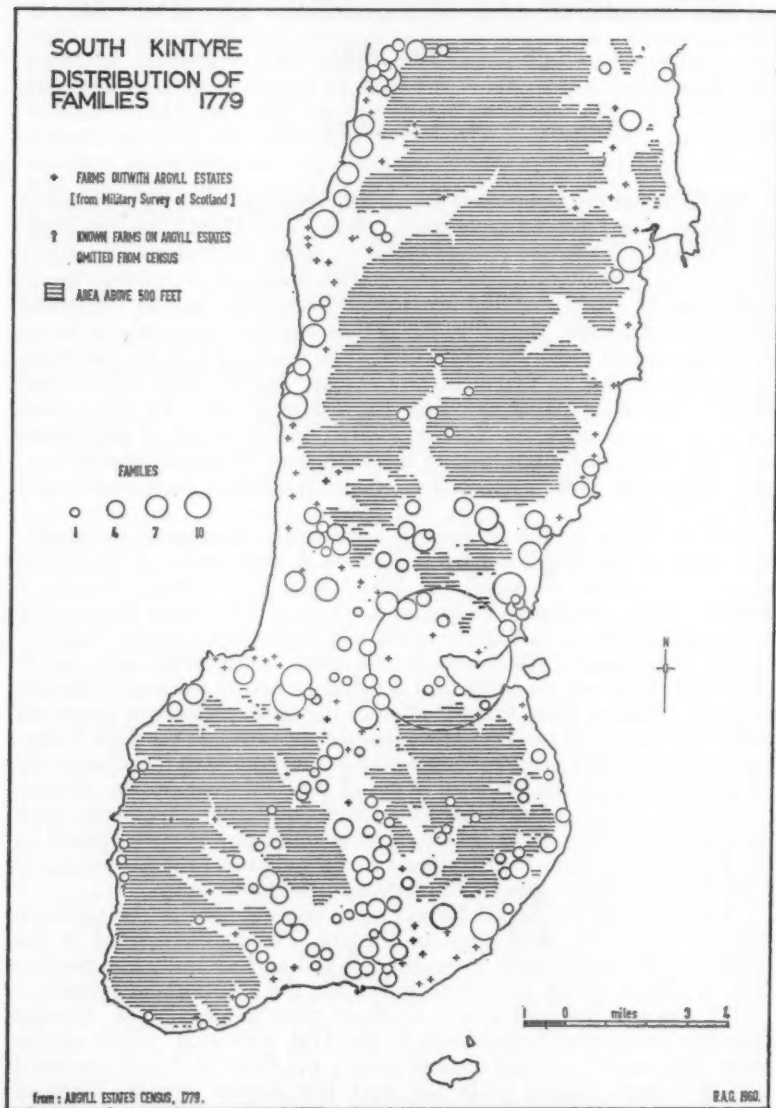


Fig. 1. South Kintyre: distribution of families 1779.

The two censuses are complementary. That of 1779 is of a summary nature and gives for each farm the number of resident families together with the number of tacksmen, tacksmen's sons, servants and cottars. The total population for each farm is not given, but this earlier list gives more explicit information as to the social structure of the population

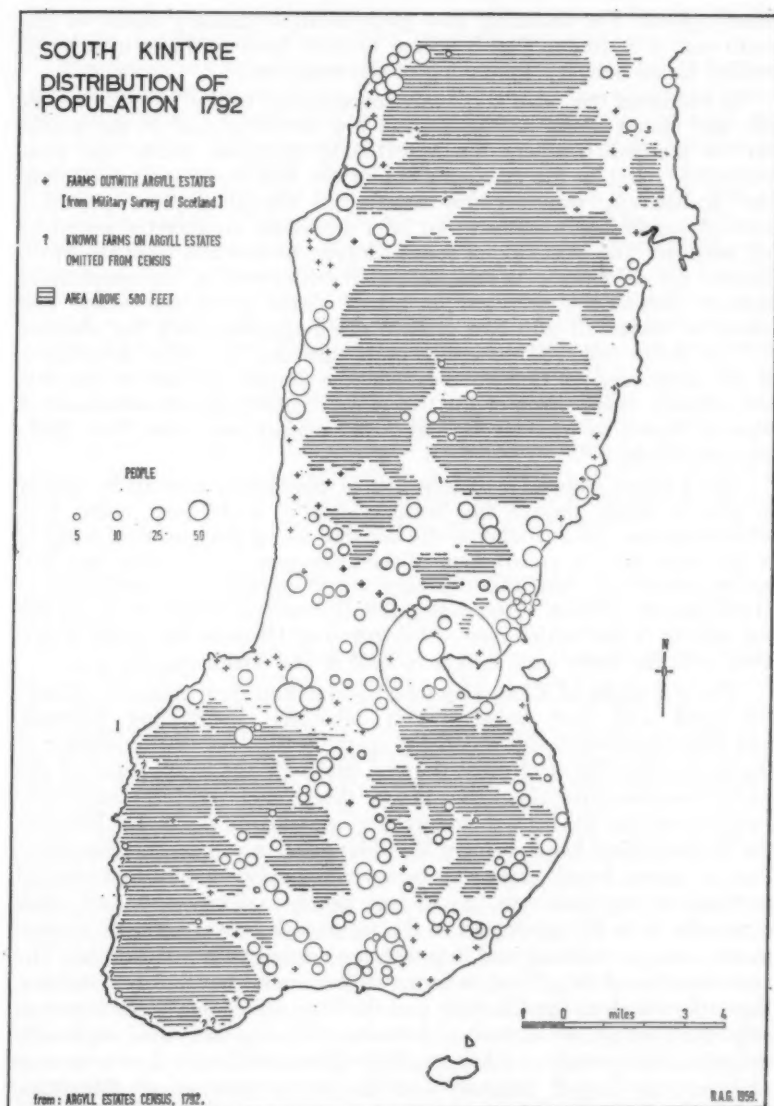


Fig. 2. South Kintyre: distribution of population, 1792.

than does the 1792 census which is only a list of the total population on each farm by name (and thus sex) and age. The distribution of population shown by these censuses has been expressed cartographically using proportional circles and the figures summarised in two tables. The distribution shown on each map is essentially similar; only minor differ-

ences appear. For instance, two large multiple-tenancy farms in the south-east of Southend Parish appear to have been split into a series of smaller farms between the taking of the censuses.

In Southend the population was concentrated in the Strone, Breackerie and Conie Glens, on the area of low fertile ground in the south-east of the parish where the MacDonald of Sanda estate was concentrated⁸, and in the smaller glens of the east coast such as Hervie and Balnabraid, where glacio-fluvial and fluvial terraces provided isolated patches of fertility in an area otherwise dominantly suited to hill pastures. The west side of south Kintyre, northwards from the Mull, showed the existence of a series of small settlements in topographically extreme sites on the steep and, in places, almost precipitous coast. The names of these fall into two groups: one beginning with the element Bal- or Bally- followed generally by a surname, the other descriptive of the sites, such as Innean-co-callich (the Innean or cleft of the five old women). Comparison of the two maps suggests the abandonment of some of these sites towards the end of the century, evidence which finds support elsewhere⁹.

The Laggan showed a distribution of population essentially similar to that of today, though the intensity was of a different order. The settlement was concentrated on the benches along the landward margins of this area and the reclamation of the moss area in the centre was still being carried out. Much of this area is still sterilised for settlement in Machrihanish airfield. Outstanding was the concentration on the southern margin in the settlements of Coalpits and Drumlemble, both associated with the early exploitation of coal in the Machrihanish area.

The remainder of Kintyre may be divided into three distinct regions: the west and east coasts which presented contrasting patterns, and Glenlussa which illustrated the sparse settlement of the interior of the peninsula. The west coast showed strikingly the significance of the raised beaches. Analysis of the sites on the ground and from large-scale maps shows that the settlements were dominantly on the higher benches, the 25-foot raised beach being still at this period in process of reclamation. *Per se*, raised beach does not necessarily imply fertility, a comment particularly applicable to the 25-foot beach in Kintyre¹⁰, and more especially so in the latter part of the eighteenth century when improvements such as enclosing and draining were only getting under way. The concentration of Argyll Estate farms on the coastal benches was striking, the valleys such as the Clachaig and the Barr remaining in other ownership. By contrast the east-coast settlement was sparser, sited especially in major valleys such as Glencarradale, Glensaddell (not shown on map and outwith Argyll Estates) and the lower reaches of Glenlussa. Typically this east coast is steeper and the coastal benches more fragmented than in the west, and the difference in fertility was accurately reflected in the smaller populations which the farms supported. Glenlussa, and by analogy probably also the upper reaches of the Barr, had dominantly small farm-populations subsisting on limited arable areas on restricted drift deposits, deriving their livelihood more from stock-rearing than was the case on the lower ground. Such, *par excellence*, were the 'muir' farms. In the more fertile areas of the west

coast and the Laggan grain played a greater part, partly due to the influence of local distilleries in the Campbeltown area ¹¹.

The Burgh of Campbeltown has been indicated on each map but the population shown in each case is but a fraction of the total, and moreover an unknown fraction. At this period the beginnings of rural depopulation might be suggested as due to the initiation of improvements, especially on the Argyll Estates even as early as the seventeenth-thirties ¹², but it was not until after 1790 that such a trend rose to importance. Before 1750 when the idea of improvement was in its infancy in the area, settlement and population were not significantly different from their circumstances in true run-rig conditions. After 1790 draining and enclosure were widespread and the large farm-steadings built around a central yard or court, typical now of the Laggan and the parish of Southend, and clearly reminiscent of steadings in the Lowlands, were introduced soon after. Between 1750 and 1790 it is impossible to point to any single date to claim that there a significant change took place. Consequently the distribution of settlement and population given by these two censuses is that during a period of continuous change. The conservatism of a tenant population in accepting a new order meant that there was a lag between the disappearance in a legal sense of the multiple-tenancy farm, and the decline of the concomitant small rural nucleation or 'clachan'.

An analysis of the altitudinal range of settlement during the period has been attempted. Comparing the farms in the censuses with those in the 1751 Valuation and on Roy's Map, it is considered that the last source gives an adequate cartographic sample of the settlement of the second half of the eighteenth century. The clachans were located on, and their altitudes estimated from, the G.S.G.S. 1:25,000 map-sheets. The sites which exist today as ruined settlements or which have disappeared totally, were noted. Some of the former in the Parish of Southend and in the vicinity of Tarbert, Lochfyne, were visited in the field. The altitudes were grouped in 100-foot categories and the resultant totals compared with the areas between the 100-foot contours as shown on the Ordnance Survey 1:63,360 map-sheets. The results are given in diagram form (Fig. 3). Clearly the settlements above 400 feet formed only a small proportion of the total settlement, despite the fact that there is a greater area between 400 feet and 600 feet than between 200 feet and 400 feet. The combined effects of altitude and exposure, then as now, were sufficient to restrict settlement, and agriculture, to the few sheltered glens above 400 feet. Of such sites about 70 per cent exist as ruined clachans. Between 200 and 400 feet there is the major concentration of such ruined settlements, but they represent a considerably smaller proportion of the original total within that range than do those above 400 feet. The decline in total settlement, and the survival of ruined clachans above about 300 feet must both be a reflection of the marginal nature of much of that area, marginal at least from the viewpoint of arable agriculture. Most of this area is now used for grazing and some of the clachans were destroyed, to be rebuilt during the nineteenth century as sheep-fanks. In spite of the slightly more restricted area below 200 feet the concentration of settlement here was notable. A more detailed analysis of the sites shows they were dominantly above 50 feet,

further emphasising the distinction already made between the lower and the upper beaches, as far as settlement and agriculture were concerned in the pre-improvement period. As this area has been in continuous occupation, the majority of eighteenth-century clachan sites are now occupied by modern farm buildings, and few exist as ruined clachans, although some disappeared totally.

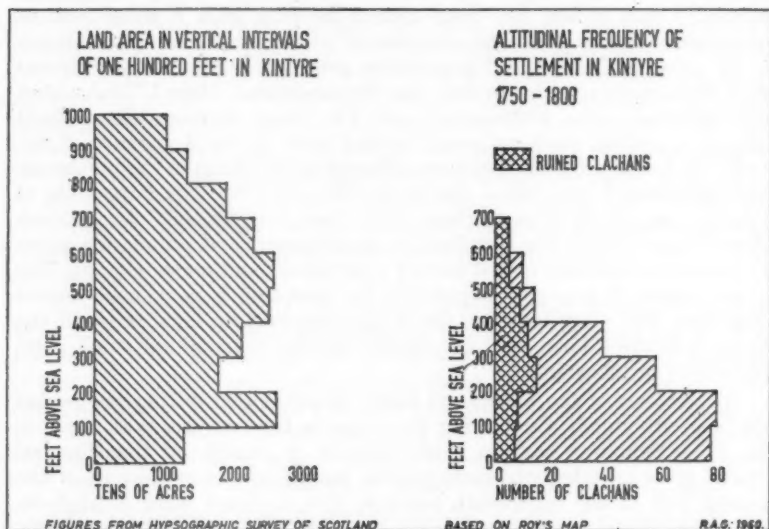


Fig. 3. Altitudinal distribution of land area and settlement (1750-1800) in Kintyre.

The ruined clachans fall into two clear groups morphologically. There are sites which show no clear indication of a logical layout; the group of dwellings and associated out-buildings are amorphous, although individual structures within the group may show a preferred orientation in one of two directions at right-angles to each other. This latter feature appears to be related to slope. Most clachans show a distinct tendency to a linear or rectangular plan. Within these clachans most of the buildings appear better-preserved than those in the other type, and many are known to have been built no earlier than the last quarter of the eighteenth century. Such is Glenrea in Campbeltown Parish, which did not appear on Roy's Map. By contrast, sites belonging to the first category such as Balmavicar in Southend Parish on the west coast, were cleared or deserted voluntarily at about the same period¹³. Most of the sites marked on Figures 1 and 2 as omissions from the censuses belong to this category. On this evidence it is tentatively suggested that the distinction in clachan sites recognisable on a morphological basis may also be valid chronologically, the amorphous clachan being earlier and the linear or rectangular clachan belonging to the period of improvement. The latter had, however, become sufficiently widespread (and exclusive?) in Kintyre for the Duke's Chamberlain to comment on it as an evil standing in the way of further improvement when advocating

the adoption of the substantial Lowland-type steading¹⁴. Further evidence is needed from other areas before this distinction in clachan morphology may be considered a really significant feature in the evolution of Highland settlement.

Apart from distributional aspects, the two censuses together provide a full portrayal of the age and sex structure of the population and of the social circumstances of the tenantry of Kintyre.

Age Group	1792			1881			1951		
	M	F	T	M	F	T	M	F	T
0-4	6.8	5.5	12.3	6.0	5.7	11.7	4.5	4.0	8.5
5-14	12.4	12.3	24.7	12.1	12.1	24.2	8.0	7.6	15.6
15-44	19.1	26.3	45.4	22.3	20.7	43.0	20.7	18.7	39.4
45-64	6.7	6.8	13.9	7.6	7.2	14.8	11.6	12.3	23.9
65-	2.3	1.8	4.1	3.1	3.2	6.3	5.8	6.8	12.4
Total	47.3	52.7	100.0	51.1	48.9	100.0	50.6	94.4	100.0

Table 1. Age and sex structure of population: figures are percentages of the total population; figures for 1881 and 1951 are derived from *The Census of Scotland*; figures for 1792 are derived from the *Argyll Estates Census*. M, males; F, females; T, total.

The age and sex structure of the population is best shown in Table I. The figures all refer to the population outwith the Burgh of Campbeltown. Striking is the small structural difference in the population between 1792 and 1881, the greater change coming during the twentieth century. The late-eighteenth century population structure is characteristic of the period before medical and hygienic improvements advanced the average age of the population. There is a significant difference between males and females in the 15-44 age category, both in 1792 and in 1951. The preponderance of women in 1792 was probably partly seasonal (the census was a summer one) and the absence of the men is commented on in the *Statistical Account for Campbeltown* at the same period, though not explained¹⁵. Seasonal work elsewhere may provide the answer such as agricultural labouring in the Lowlands, or fishing, although the latter seems unlikely in view of the evidence adduced by Gray on the fishing industry of the period in the south-west Highlands¹⁶. Work in Campbeltown Burgh may be partly responsible, but as the number involved is of the order of 300, this will not provide the complete answer. The reverse, an excess of men, is evident in 1951. This feature is clear in many Highland areas where many of the women are temporarily away in service or more or less permanently in occupations such as nursing and teaching.

Table 2, derived from the 1779 census, summarises the social and tenurial status of the population. The adjustment of the Campbeltown figures is the omission of the exceptional coal-mining settlements of Coalpits and Drumlemble. The figures for south Kintyre (Southend and Campbeltown) show the effects of agricultural improvement on the population. Many of the farms had by now become single tenancies with a corresponding reduction in the number of cottars per farm. Now, the

Parish	1	2*	3*	4*	5
Southend	2.9	1.3	1.5	1.6	38
Campbeltown	3.5	1.4	2.0	2.0	41
Campbeltown (adjusted)	3.1	1.4	2.0	1.6	42
Killeen and Kilchenzie	4.5	2.0	1.7	2.5	29

Table 2. Social and tenorial averages, 1779. * Refers to males only.

1. Number of families per farm; 2. Number to tacksmen per farm; 3. Number of servants per farm; 4. Number of cottars per farm; 5. Number of single-tenancy farms as a percentage of the total number of farms.

term tacksmen must be restricted to mean merely a tenant holding a lease or tack. The social connotation of the term applicable before 1750 when the tacksmen represented a middle class in society does not apply¹⁷. Killeen and Kilchenzie may be taken as typical of central and north Kintyre where, in terms of population, the joint-farm with its concomitant clachan still existed, even though run-rig had disappeared in many cases. Here the proportion of single-tenancy farms was significantly lower, a feature brought out on the maps where the relatively large farm-populations are evident. Again, the number of cottars per farm was significantly different, emphasising the more traditional nature of the society where, as in the run-rig period, the cottars acted as tradesmen, particularly weavers, for the local community. The proximity of the Burgh and the increasingly commercialised nature of the agriculture inevitably brought about the decline of the cottar class in south Kintyre. However, the number of servants per farm appeared to be more constant throughout Kintyre suggesting that the single-tenancy farm with its need for farm and domestic servants was a force to be reckoned with everywhere in the peninsula. The thin end of the improving wedge had been driven in, alike in south and north, and the difference between the two areas was really an expression of the time lag inherent in the acceptance of innovation in a rural community when that innovation spread from a single area. The suggestion is that the improvement of the Argyll Estates began in the south and spread gradually northward.

Unfortunately detailed estate censuses for Highland areas in the eighteenth century occur rarely. The Argyll Estates show the value of such sources, particularly when viewed in the light of field evidence and other contemporary sources of information, such as the *Statistical Accounts* of the seventeen-nineties, estate rentals and Roy's Map. The value of such sources in historical geography need not be stressed.

The author expresses his indebtedness to His Grace, The Duke of Argyll for permission to consult and publish material based on manuscript sources in his possession. Also, Mr E. R. Cregeen of the Extra-Mural Department of Glasgow University, Mr Duncan Colville of Machrihanish and the staff of Register House, Edinburgh have given valuable assistance.

¹ a) Lebon, J. H. G. The Process of Enclosure in the Western Lowlands. *S.G.M.*, 1946, 62, : 100-110.

b) Lebon, J. H. G. Old Maps and Rural Change in Ayrshire. *S.G.M.*, 1952, 68, : 104-109.

- ² a) Third, Betty M. W. Changing Landscape and Social Structure in Scottish Lowlands as Revealed by Eighteenth Century Estate Plans. *S.G.M.*, 1955, 71, : 83-83.
- b) Third, Betty M. W. The Significance of Scottish Estate Plans and Associated Documents. *Scottish Studies*, 1957, 1, p 39-64.
- ³ "List of Families residing on His Grace The Duke of Argylls Property in Kintyre, . . ." 1779. *Argyll Estate Papers*. This Census is being prepared by Mr E. R. Cregeen for publication.
- ⁴ *Argyll Estates Census, 1792*. In volume with Chamberlain's Accounts and Kintyre Feu Duties. Deed Box : Rosneath No. 8.
- ⁵ *Valuation of the Shire of Argyll, 1751*. The author worked from a typescript copy in the possession of Miss Campbell, Kilberry, South Knapdale. There is also a copy in Register House, Edinburgh.
- ⁶ O'Dell, A. C. A View of Scotland in the Middle of the Eighteenth Century. *S.G.M.*, 1953, 69, : 58-63. This is a discussion of Roy's Map in general terms.
- ⁷ The Laggan is the name given to the triangular area of Lowland which has its apex at Campbeltown and its base on Machrihanish Bay.
- ⁸ Examination of Rentals for this estate suggests an analogous distribution and structure of population for the first three-quarters of the eighteenth century. Register House, Edinburgh, MacDonald of Sanda, Box 2, Nos. 172 and 173.
- ⁹ *New Statistical Account*, Vol. VII, 1845, Southend, p. 435.
- ¹⁰ M'Clement, J. The Distribution of Agriculture in Kintyre. *S.G.M.*, 1927, 43, p. 27.
- ¹¹ *Statistical Account*, Vol. X, 1794, Campbeltown, p. 556. Also, M'Clement, *op.cit.*, p. 23.
- ¹² McKerral, A. Early Emigration from Kintyre to America. Unpublished MS in possession of Kintyre Antiquarian Society, Campbeltown. K.A.S./257, p. 2.
- ¹³ *loc.cit.*, ref. 9.
- ¹⁴ "Report on Duke's Property at Campbeltown and Southend." 1810, p. 106. Deed Box : Rosneath No. 3.
- ¹⁵ *Statistical Account*, Vol. X, 1794, Campbeltown, p. 545.
- ¹⁶ Gray, Malcolm. *The Highland Economy, 1750-1850*. 1957. p. 120.
- ¹⁷ McKerral, A. The Tacksman and his Holding in the Southwest Highlands. *Scot. Hist. Rev.*, 1947, 26.

GEOGRAPHICAL REFLECTIONS ON MODERN MAPPING

(See pp. 77-84)

Solution to Figure 1 : All three maps are drawn to the same scale.

Solution to Figure 2 : Central America and Persia are smaller in scale than all the other areas by approximately one-third and one-half respectively.

COLONEL GEORGE GREENWOOD

THE FATHER OF MODERN SUBAERIALISM

D. R. STODDART

The decade 1860-1870 saw a great step forward in the acceptance of uniformitarian views in geomorphology, views which had been advanced by James Hutton in his *Theory of the Earth* in 1795 and persuasively argued by his friend Playfair, but which had fallen into disregard for over half a century. First Buckland, with his emphasis on the Noachian Deluge, and later Lyell, who favoured the work of faulting and of submarine currents in the excavation of valleys, explicitly or implicitly denied the importance of Hutton's main thesis, which was progressively lost sight of, in spite of Poulett Scrope's demonstration of the effectiveness of subaerial causes in his memoir on Central France.¹

A series of classic papers in the eighteen-sixties, however, on the origin of valleys and the arguments in favour of valley-cutting by rivers rather than the sea, turned British geology away from catastrophism and similar creeds, and to some extent anticipated the work of Gilbert and Powell in the American south-west. Papers by Jukes² and Le Neve Foster and Topley³ initiated the great controversy in the pages of the *Geological Magazine*, in which Poulett Scrope for the subaerialists and Mackintosh for the marine denudationists answered each other paper for paper⁴. By 1870 the battle in this country had been won, and the subaerialists carried the day.

Playing a prominent part in this Huttonian renaissance, and with some claim to its initiation, was a retired Guards officer, farming his family estate in Hampshire, named Colonel George Greenwood. In 1844 Greenwood had published a curious manual called *The Tree Lifter; or a new method of lifting forest trees*, which in itself is of little interest, but the following decade saw Greenwood's interest in large-scale gardening lead to investigations into soil fertility and ultimately geomorphology. Some of his conclusions were incorporated in the second edition of *The Tree Lifter* in 1853, where they attracted little if any notice, and the Colonel therefore decided to write a new book devoted solely to geological matters, at the same time bombarding the *Geological Magazine* and the *Athenaeum*⁵ with outspoken letters on his discoveries. Greenwood's main work, *Rain and Rivers; or, Hutton and Playfair against Lyell and all comers*, appeared in 1857, and new editions appeared in 1866 and 1876. So vigorous was Greenwood's propaganda against the marine denudationist school in the last twenty years of his life, that David Mackintosh, its principal exponent, termed him "the father of modern subaerialism"⁶, yet today Greenwood's work is virtually forgotten.

Greenwood's main thesis was the supremacy of rainwash as an agent of land sculpture, and the relative unimportance of streams and rivers. Marine erosion he contemptuously rejected, believing with Hutton that "... great effects come from causes which are not very visible.... and no drop of rain runs an inch on the surface of the earth without, as far as it goes, setting some soil forward on its road to the sea. And it won't come back again. It will wait there and go on by the next-rain (*sic*). for the whole surface of the earth is in perpetual movement, by the wash of rain to the bottom of the sea."⁷

The evidence for the efficiency of rainwash was found in Greenwood's own chalk countryside: the variation of the soil profile on chalk hillslopes⁸, for example, and the manner in which terraces were formed along the line of fences.⁹ Greenwood makes the significant point that the efficiency of rainwash depends on percolation, since "... in proportion as the surface of declivities is hard and imporous, the rush of rain and its power accumulate. So that, although declivities whose surfaces are soft are for this reason more easily degraded, — by their porousness, which is generally a consequence of their softness, they are to a certain extent protected from denudation".¹⁰ And Greenwood went on to discuss, though in a somewhat confused manner, the evolution of slopes under varying conditions, and in particular the development of hill-top convexities so prominent in the chalk countryside.¹¹

In emphasising the importance of rainwash Greenwood tended to underestimate the work of rivers: "It is true that the *direct* action in waste and denudation of torrents and rivers is on lines only, and were it not for the *lateral* work of rain, this their direct action would only cut ravines and channels to the sea¹².... In comparison to the broad waste from the wash of rain, the waste by the *direct* action of rivers may be reckoned as nothing; and even this waste by the direct action of rivers takes place, I might say, *entirely* when they are flooded by rain. The real main geological work of rivers is *indirect*; that is, the carrying off the traffic brought to them by the wash of rains".¹³

Greenwood's main contention was to disprove Lyell's ideas on the Weald drainage, but in so doing he outlined one of the fundamental laws of geomorphology many years before it received its classic statement by Powell. This was the idea of base levels of erosion, implied in the discussion of the effect of fences and other barriers on slope form. "The sea," Greenwood declared, "ends every valley, but it never yet *began* one; that is, where there is no delta.... it is the sea which prevents the further deepening of the estuary".¹⁴ This controlling action of the sea resulted in retrogressive alluviation and the gradual flattening of the lower part of the river profile. Greenwood thus anticipated Powell's statement of 1875, that "the level of the sea" is "a grand base level of erosion, below which the dry lands cannot be eroded", and, like Powell, he went on to discuss "other base levels of erosion" "for local and temporary purposes".¹⁵ In a letter published in 1863, Greenwood wrote: "Every barrier of hard rock which crosses the bed of a river or valley becomes a negative key to the depth of the river and valley above the barrier. Thus deep shalt thou go and no deeper. But as denudation is ever at work, the bed of the river and of the valley above the barrier become horizontal at the same level as the barrier".¹⁶

Greenwood's work, therefore, is noteworthy on two accounts: for its recognition of the importance of rainwash in land sculpture, and for its early statement of the principle of base-levels of erosion. His other work is of little significance — he correctly deduced, for example, the mechanism of lateral movement of beach material¹⁷, but his views on river terraces and the glacial question were mistaken. While his opinions on these questions did not endear him to his younger contemporaries, his antiquated views on the descent of man were not even treated seriously, and the vigour with which he urged them may have overshadowed his more important contributions and led to his lapse into obscurity. He was, too, an amateur often arrayed against the professionals, whom he criticised with military bluntness, and the style of his writing gained it a reputation as a mere facetious polemic. This in itself is significant, however, for Colonel Greenwood's place in the history of geomorphology rests not only on his very real theoretical contributions, but on his tremendous propagandist activity for the Huttonian cause, and some of his writings are not unworthy of Playfair himself: "In fact, rain, which we consider only as a productive power, is the destroyer, the dissolver of continents. Subterranean igneous action, which we consider only as a destructive power, is the producer, the replacer of continents. And the cause which caused the valleys is in as full operation at this moment as ever it was. Indeed, valleys only exist in the dissolution of the hills; that is, in the gradual and eternal wash by rain of the existent earth into the sea."¹⁸

¹ Hutton, James. *The Theory of the Earth, with Proofs and Illustrations*. Edinburgh, 1795 (reprinted 1959). Playfair, John. *Illustrations of the Huttonian Theory of the Earth*. 1802. Buckland, W. *Reliquiae Diluvianae, or observations.... attesting the action of an Universal Deluge*. London, 1823. Lyell, Charles *Principles of Geology*.... London, 3 vols., 1830-33. Poulett Scrope, G. *Memoir on the Geology of Central France*.... London, 1827. See pp. 161-165.

² Jukes, J. B.: On the mode of formation of some of the river valleys in the South of Ireland. *Quart. J. geol. Soc.*, London, 1862, XVIII, pp. 378-403.

³ Le Neve Foster, C. and W. Topley. On the superficial deposits of the valley of the Medway, with remarks on the denudation of the Weald. *Quart. J. geol. Soc.* Lond., 1865, XXI, pp. 443-474.

⁴ See, for example: D. Mackintosh. The Sea against Rain and Frost, or, the origin of escarpments. *Geol. Mag.*, 1866, III, 63-70; D. Mackintosh. The Sea against Rivers, or, the origin of valleys. *Geol. Mag.*, 1866, III, 155-160. Poulett Scrope, G. On the origin of valleys. *Geol. Mag.*, 1866, III, 193-199.

⁵ Greenwood's published works included:

1839. *Hints on Horsemanship.*
1844. *The Tree Lifter; or, a new method of lifting forest trees.* First edition.
1853. *The Tree Lifter...* Second Edition.
1857. *Rain and Rivers; or Hutton and Playfair against Lyell and All Comers,* First Edition.
1866. *Rain and Rivers...* Second edition.
1876. *The Tree Lifter...* Third edition, edited by G. Greenwood (Colonel Greenwood's nephew).
1876. *Rain and Rivers...* Third edition, edited by G. Greenwood.
1877. *River Terraces.* Edited by G. Greenwood (collected correspondence).
- Greenwood was born in 1799, educated at Eton, gazetted in the Life Guards 1817, became Colonel in 1837, retired in 1840, and spent the rest of his life on his estate at Alresford in Hampshire. He died in 1875.
- ⁶ Mackintosh D., in *Geol. Mag.*, 1866, IV, pp. 571-575.
- ⁷ *Tree Lifter*, 2nd Edition, pp. 182-3.
- ⁸ *Idem*, p. 194.
- ⁹ *Idem*, p. 195.
- ¹⁰ *Idem*, p. 187.
- ¹¹ *Idem*, p. 188.
- ¹² *Idem*, p. 184.
- ¹³ *Idem*, p. 189.
- ¹⁴ *Rain and Rivers*, 3rd Ed., p. 204.
- ¹⁵ Powell, J. W. *Report on the Exploration of the Colorado River of the West and its Tributaries.* Washington, 1875, p. 203.
- ¹⁶ *Athenaeum*, December 26, 1863, letter on Glen Roy; see *Rain and Rivers*, 2nd Ed., pp. 131-134.
- ¹⁷ *Rain and Rivers*, 2nd Ed., pp. 115-116.
- ¹⁸ *Idem*, 1st Ed., p. 198.

RIVER FLOW STUDIES IN SCOTLAND: A PROGRESS REPORT

R. MACLAGEN GORRIE

The Royal Scottish Geographical Society established in 1957 a standing committee for river flow studies. The group includes representatives of the four university geography departments, civil engineers, land-drainage and water-use specialists, meteorologists, foresters and planners. Others interested are invited to participate and should address themselves to the Convener, River Flow Studies Committee, R.S.G.S. The main tasks visualised for the committee were:— to collate flood records; to review any research work and encourage fresh efforts in research or survey of river behaviour; to ensure the publication of any suitable material; to advise local authorities when called upon; where warranted, to stimulate action on flood control and flood reporting; to arrange for immediate reconnaissance of floods as they occur; and to encourage longer-term studies bearing upon evapo-transpiration and the demands upon existing water supplies.

So far the committee has not been able to finance work either in the field or in the detailed examination of existing records. It has provided, however, a platform for discussion and brought together interests which would not otherwise meet. The committee is now in fact operating as a seminar at which various aspects of water studies have been discussed. Amongst the problems and projects dealt with, the following have been of particular value and interest:—

- (a) Flood reporting needs co-ordination amongst the many local bodies concerned;

a great many more river gauging stations and rain-gauges are required (S.G.M. 72/1, Halstead).

(b) Pollution authorities' terms of reference under Rivers (Prevention of Pollution) Scotland Act of 1951 are severely restricted and confine their gauging to low levels, not to flood levels. The Anglers' Co-operative Association is a major influence in identifying pollution sources.

(c) The true function of peat as a factor in river flow is not well understood although research bodies (Macaulay Soil Research Institute and Nature Conservancy Moorhouse Station) are studying this angle.

(d) The effect on river flow of mechanical deep-draining of sheep moors and for afforestation, and other changes in land use, require special study.

(e) The high-level collection of water from hill torrents under North of Scotland Hydro Electric Board projects is likely to bring about major changes in the stream-bed profile, both above and below the take-off.

(f) Fresh-water Fisheries research at Faskally indicates that spawning conditions in river beds can be greatly improved by building shingle bars across the stream (S.G.M. 75/2, R. Miller's review of T.A. Stuart's work).

(g) Glasgow Royal College of Science post-graduate course in Environmental Control Engineering has pioneered the teaching of water as a resource. The Scottish Council (Development and Industry) is arranging for a Scottish Resources Survey which will include water as a major resource.

(h) Five papers presented at a symposium at the British Association in Glasgow in 1958 were reviewed in *Nature* of November 1st, 1958 under the title "Water Resources and Water Needs in Scotland".

(i) Studies of recent floods have been published from time to time in S.G.M. 70/1 (Lochaber) and 72/3 (the Bordes) both by R. Common; 73/2 (Cairngorms) by Baird and Lewis, 74/1 (Moray) by Green, but others have remained in manuscript in the Nature Conservancy Library.

(j) The need for publication of a water map is great; it should give enquiring industrialists all available information about useable water resources.

(k) At the 12th meeting Mr J. A. B. Scott, A.M.I.C.E., Water Engineer for Edinburgh, gave a talk on the city's water supply, illustrated with colour slides and several charts and maps. The Scottish Parliament passed an act in 1621 for a contractor to bring water by gravity from Comiston Springs to a tank on Castlehill. In 1761 the Swanston Springs were developed. In 1819 the South Pentlands were developed and water was introduced to individual houses for the first time; Telford and Rennie were connected with this work. Glencorse and Loganlea, both developed at that time, are still in use as reservoirs in the Talla pipeline. In 1874 the Moorfoot reservoirs Gladhouse, Portmore, Edgelaw and Rosebery were developed, and in 1905 the Talla. In 1952 the Talla was supplemented by the Fruid and Monzion streams which gave an additional six million gallons a day. The proposed Fruid Dam will further increase this storage by something like 2,000 million gallons. The present supply with full reservoirs is for 174 days.

In the discussion which followed about the 1959 shortage it was pointed out that the 1955 shortage was quite as acute all over Scotland but that the 1959 one was more intense for Edinburgh. The difference in performance as between Gladhouse and Talla was found to be due to the steepness of the slopes and the rocky nature of much of the Talla upland giving a flashier run-off, but the peaty nature of Gladhouse was a big factor in the longer time-lag before any trend of either filling or emptying is reversed in accordance with actual rainfall. The daily consumption per head runs at about 60 gallons; out of this, 40 gallons is domestic and 20 industrial. The detection of waste is an expensive operation but Mr Scott considers it very much worth while and he has a permanent staff dealing with this problem.

(l) Glasgow and Aberdeen Universities' Geography Departments have established research groups dealing with the Clyde and Findhorn respectively in terms of rainfall, run-off, river flow and hydrology on a catchment basis.

(m) Mr R. W. Covill D.P.A., etc., River Inspector Lothian River Purification Board, gave an illustrated talk on Water Conservation and Sewage and Industrial Waste Treatment in the Ruhr. He first described the organisation and function of the German River Boards, showing that they are on a much more comprehensive basis than their counterparts in Britain, and have executive powers extending to the whole of each river catchment. The various works of the Ruhrverband, Emscher-genossenschaft, Lippverband, Wuperverband and Niersverband were illustrated;

these included reservoirs for the supply of potable water for domestic and industrial use, river-flood prevention works, and industrial and domestic sewage treatment plants; the latter included some new processes and a wide variety of equipment.

There still remains an urgent need for a general assessment of the value of existing but unworked data in various county and departmental engineers' offices of rainfall, flood and river performance data, also a fresh assessment of the gaps in our river knowledge which can only be filled by a much more comprehensive network for collecting data of river behaviour.

The drought of 1959 should produce a fresh crop of statistics on river behaviour, but it will take time before the rainfall and run-off data are compiled and made available in the next-but-one *Surface Water Year Book*. Meanwhile an analysis of available data for previous years shows how badly off we are for reliable figures. An examination of the *Surface Water Year Book*, shows that only three streams now have a total of ten or more annual readings for the ratio of run-off to rainfall. These are the Ness, the Dee and the Fruid tributary of the Tweed. The last incidentally is partly responsible for Edinburgh's 1959 water shortage, as it has been piped into the Talla reservoir system from 1952 onwards, and it was hoped that this augmentation would be enough for any emergency.

The rainfall and run-off from two of our major and most valuable rivers, the Tay and Spey, are not published in a form which will give this ratio, and the reason given is: "The natural run-off is affected by artificial reservoirs, catchment channels, etc. and external water is introduced into the drainage area. . . . Owing to these hydrometric complications, mean discharge per square mile and run-off are not quoted. . . . Rainfall values are not given due to insufficient data being available for accurate assessment".

MAPPING BRITAIN EXHIBITION

IAN A. G. KINNIBURGH

Of the activities organised to mark the occasion of the Royal Scottish Geographical Society's 75th Anniversary one of the most ambitious has recently been held in the Royal Scottish Museum in Edinburgh, where, for eight weeks in May, June and July, an exhibition was mounted to show how our country is mapped. This exhibition illustrated primarily the work of the Ordnance Survey and was mounted jointly by the Society and the Survey. The Society is most grateful to the Director General of the Ordnance Survey for his willing co-operation and generous assistance in this respect.

The Society itself organised the exhibition, arranged for the publication of the special booklet on map-making which was made available to visitors to the exhibition, and provided a display of selected old maps which served as an introduction to the exhibition. These maps showed the historical progression from the early primitive maps, such as those of Ptolemy, Gough and Harding, through the early Italian maps of Scotland and examples of the work of the Dutchmen, Ortelius and Mercator, to the private surveyors such as Arrowsmith and Ainslie who were contemporaries of the early Ordnance surveyors. Old maps invariably attract attention and in this respect, the display was eminently successful. The two most important exhibits in this section were under almost continuous scrutiny throughout the period of the exhibition. These items were both original manuscripts and neither has been on public display in Scotland before. For its size, the section of Timothy Pont's manuscript on view drew most attention. The part shown was Sheet No. 34 on Cash's list (see *S.G.M.* Vol. XXIII) known as "Clydesdale". This section was chosen to show the amazing amount of detail which Pont attempted to include on his map, the characteristic Pont 'system' of ignoring scale and North Point — which reflects incidentally, on the calibre of the Gordons who made the whole survey intelligible — and the date of 1596 which appears on this manuscript. This is the only date on the whole survey. In an adjacent case Blau's *Atlas of Scotland* (1654) was displayed open at the page which shows *Scotia Regnum*, the culmination of Pont's

and the Gordons work. The importance of Pont's single-handed great work cannot be over-estimated in Scottish cartography and a detailed note, together with an illustration of part of one of the sheets of the survey is contained in the Society's booklet specially prepared for the exhibition.

The other 'star attraction' in the section devoted to early maps was a case displaying two parts of William Roy's manuscript of the Scottish mainland. Sometimes known as the "Military Survey", or the "Duke of Cumberland's Map", this survey was conducted between the years 1747 and 1755. For most of that time Roy was at the head of the team of about fifteen artists and surveyors who made this "magnificent compass sketch" on Government orders after the Forty-Five. The two sections on show served to illustrate exactly how magnificent this work was. A highland area, that of Ben Nevis itself (see Plate 2 where part of this section is shown), and a lowland area, the district around Edinburgh, were chosen and together brought out fully the great attention to detail, the respect for accuracy, and the consummate beauty of this manuscript map. Many visitors commented upon the striking portrayal of relief in the work, and it is interesting to reflect that modern trends in cartographic interpretation of relief features have re-introduced visual methods again. As in the case of Pont, there is an illustration of part of Roy's manuscript in the exhibition booklet.

Bearing in mind Roy's principles of accuracy and beauty in maps, it is not surprising to note that Roy realised the need for further Government interest in map-making. William Roy died in 1790 without his dream of a national survey realised but, had he lived only one year longer, he would have had his wish. It was in 1791 that the Survey was founded and it is a tribute to Roy that he has become known as "the father" of the Ordnance Survey. It was felt fitting, therefore, in the exhibition, that the historical display should conclude with examples of Roy's work, and, after passing "the father's" work, one found oneself confronting the work of his most prodigious son. In this hall were displayed examples of all aspects of modern survey and cartographic techniques. Traditional methods of ground surveying were on view beside the perhaps less orthodox, but no longer new methods of air survey. Two British air-survey cameras and illustrations of a Swiss instrument were on display. A model of a new British camera, at present undergoing tests for use in Britain, attracted considerable attention as did the display of various stereoscopic 'models' set up beside large detailed illustrations of plotting machines in operation. Considerable 'local interest' was stimulated by the inclusion, in this section of the exhibition, of a set of progressive drawings of the first sheet of the new Six Inch map of the Scottish Highlands. The finished map, of the Foinaven area, was also included alongside the old Six Inch sheet of the same area. This provided a most convincing argument, if one were needed, for more use of photogrammetric techniques.

The ground surveyor was, however, not left out of the picture. As already mentioned, his instruments and methods were well shown. Items on his aspect of the work of surveying included a special case showing the method of use of the tachometer, a group of levels showing the progress made from the middle of last century to the present-day self-aligning level, but perhaps the most interesting instrument of the whole exhibition was the tellurometer which was included in this section. This modern electronic instrument, capable of measuring distances of thirty miles to an accuracy of six inches, attracted the attention of both technical experts and laymen alike. It became a centre of attraction for many hundreds of school pupils, for example, who visited the exhibition in groups daily. In an adjacent case stood the venerable Ramsden eighteen-inch theodolite carrying its near century-and-a-half of years, one felt, with dignity and not in the least over-awed by the presence of the coolly efficient tellurometer. The 'Ramsden' was one of a series of old theodolites which were on view to show how these instruments too have changed through the years.

The two instruments, modern tellurometer and ancient Ramsden theodolite, perhaps symbolise the exhibition in that they show the traditional methods of survey, rooted in the past, and the modern ideas, now grafted on to the old root stock, which are today yielding better surveys and better maps. The effect of improved instruments on modern maps could be seen in a section of the exhibition devoted to the art of the map-maker. Here scribing techniques, on glass and plastic, were shown as well as displays to illustrate the preparation of Ordnance Survey plans from blue key to stick-up-fair-drawing to zinc printing-plate. Also shown in this part of the exhibition was the *Lorn and Lochaber* hill-shaded Tourist

Sheet of the Seventh Series One Inch map. This exhibit demonstrated graphically how hill-shading, and also hill-lighting, is drawn, photographically processed and applied to the existing Seventh Series map. One sheet of the new Quarter-Inch Fifth Series was also displayed in the same section.

Other aspects of map-making, including the methods of defining archaeological sites from air photography, for example, were also on display.

The exhibition proved a most rewarding project and enquiries about it have come in from all over Scotland as well as from various other parts of the British Isles. Requests for copies of the special booklet entitled *Mapping Britain* are still being received and have, so far, come from many parts of Europe and the United States as well as from individuals, schools and universities in Britain. In his opening remarks, the President of the Society recalled something of the importance of the map to the geographer and this exhibition has confirmed that comment and also shown clearly the wide number and variety of people, at home and abroad, who are interested in the many skills involved in Mapping Britain.

GEOGRAPHICAL ESSAYS IN MEMORY OF ALAN OGILVIE

A REVIEW

ROBERT W. STEEL

Honour can be paid to a scholar in various ways. Sometimes re-publication of a selection of his own work seems best. In other cases the proper tribute is the *Festschrift* — the collection of essays written by those who have come under the teacher's influence as students, research workers or colleagues. Such a series may follow a particular theme where the scholar's special contribution has been in a very clearly defined and perhaps narrow field. But for someone with the range and diversity of interests of Alan Grant Ogilvie, the volume¹ in his honour needed to show the many fields into which he went so eagerly and profitably and where his disciples have faithfully followed in later years.

This collection of geographical essays, designed to mark the twenty-fifth anniversary of Ogilvie's Honours School in Edinburgh, became a memorial volume following his sudden death in February, 1954. All who knew and admired Ogilvie, as well as the many who knew him only by repute and through his writings, will welcome it. They will be indebted to the editors who arranged the selection of essays and have written an appreciative preface; to the authors of the ten papers; and to J. N. L. Baker who, with his special knowledge of the early days of modern geography in Oxford and of Ogilvie's associations with A. J. Herbertson and H. O. Beckett, writes of Ogilvie's place in British geography.

Some would group the ten essays into two — systematic and regional — after the fashion of today, but such was not to Ogilvie's way of thinking: and the editors, recognizing him as, in Mr Baker's phrase, "perhaps the last of the great British regional geographers", have divided the volume into two equal halves — essays on Scotland and essays overseas. Thereby their collaborators indicate both the kinds of geography and the geographical areas that interested Ogilvie and that are studied today by those who came under his influence.

Ogilvie firmly believed in the fundamental significance of the physical basis of regional geography and looked for its manifestations in the land use and settlement of any area that he studied. He also recognized the importance of comparative study in regional work. Thus D. L. Linton employs the comparative method in geomorphology in "Morphological contrasts of eastern and western Scotland" and T. W. Freeman compares the differing rural landscapes of south-west Scotland and north-east Ireland, each "the expression of a complex economic and political history". The attraction of an island for studies in regional geography — "the fascination of a microcosm" — is shown in R. Miller's "Orkney: a land of increment". Ogilvie's increasing awareness of the time element in geography (the title of his Presidential Address to the Institute of British Geographers in 1952) is echoed in several essays, notably by J. Wreford Watson, whose account of the relict geography of the urban community of Halifax, Nova Scotia, shows how

"place and time are continuously and inexplicably bound together". The same ideas reappear in widely different contexts, in K. Walton's analysis of ancient elements in the coastline of north-east Scotland and in Lady Swanzy Agnew's assessment of the pioneer legacy in South African farming. Yet another of Ogilvie's beliefs — that geography should "serve in the concerns of the times", as the editors put it — is illustrated by A. MacPherson who, in his account of the land-use problems of Scotland's hill areas, suggests that geographers have a real contribution to make towards that economic and social rebirth which is essential if these extensive parts of Scotland are not to become derelict areas.

But though Ogilvie was always and especially concerned with Scotland and its problems, his other interests took him very far afield. In addition to the essay on Halifax to recall his associations with the Americas, and particularly with the American Geographical Society, there is J. K. Wright's account of some British "grandfathers" of American geography as a tribute to Ogilvie as "one of a long line of British geographers who have helped to advance the study of geography in the United States". J. M. Houston's study of land use and society in the Plain of Valencia is typical of Ogilvie's own Mediterranean experiences and of his special knowledge of the areas with which his own posthumous *Europe and its borderlands* is concerned. The interest in the less developed parts of the world that he fostered in his own department at Edinburgh, and indeed in British geography generally, is recalled not only by Lady Agnew's paper but also by A. T. A. Learmonth's essay on geography and health in the tropical forest zone. The great expansion of geographical studies in the tropics, particularly in Africa, owes an immeasurable debt to Ogilvie who for nearly thirty years was secretary, and later chairman, of the Committee of Section E of the British Association that sought to increase our understanding of the geography of tropical Africa, and whose Presidential Address to Section E in 1934 dealt with the human geography of Northern Rhodesia.

Africa, India, the U.S.A., the Andes, Europe, the British Commonwealth, Scotland, all formed a part of Ogilvie's make-up as a geographer. Each had its physical basis, its historical element, its regional associations. His interests were just as far-ranging as the essays in this book. No matter how we seek to explain the greatness of the man, this is a worthy memorial to him. One suspects that Ogilvie who, as Mr Baker reveals, was part-author of the War Office's *Manual on Map Reading and Field Sketching* would have raised an eyebrow at the lack of any scale on at least a third of the maps in the volume: but there is no doubt that he would have approved of the cartography and of the extensive documentation in the essays as well as of their individual content, and would have appreciated the thought behind the production of such a book in his honour. An admirable photograph recalls Ogilvie the man to those of us who were fortunate enough to know him, just as the volume as a whole reflects Ogilvie the geographer and some of the many whom he taught or with whom he worked. One is reminded afresh of the worth, and the breadth of vision of one who, in the words of the editors, "saw Geography simply as another avenue of approach to the great unities of space, time, life and humanity that were his ultimate world": and one is grateful for the memory.

¹ *Geographical Essays in Memory of Alan Ogilvie*. Edited by R. Miller and J. Wreford Watson. 9×6. Pp. XVI+246. 42 figs. 12 plates. Edinburgh and London: Thomas Nelson and Sons Ltd., 1959. 42s.

REVIEWS OF BOOKS

North England. By A. E. Smailes. Regions of the British Isles Series, 10 × 6. Pp. XI+324. 66 figs. 46 plates. 1 folding, full-colour map. Edinburgh: Thomas Nelson's & Sons Ltd, 1960. 50s.

This is an interesting and useful book. One of a series of regional studies, it is very welcome and no doubt will be much in demand. Perhaps it is especially interesting because of the strengths and weaknesses made apparent by the method of approach adopted by the author.

The first few pages are devoted to an Introduction. At one or two points this material falls short of the high standard of presentation characteristic of the greater part of the volume. Such expressions as "Carboniferous capitalism" make little useful contribution. In Part I, entitled "The Physical Setting", the author really begins to get into his stride. The material is well-presented, balanced and clear. There is a pleasing absence of unnecessary and confusing detail. It is most apparent that the author has a genuine feeling for the area, and its character begins to emerge. The bibliography relevant to these chapters is good although the absence of specific reference to some works, for instance, Hickling and Smythe, is a little surprising. Part II takes us systematically through the phases of human occupation of North England. These are valuable chapters and Professor Smailes has made most effective use of the rich resources available. The drama begins to come to life and the reader has every opportunity to recognise and understand the quality and nature of the component parts of the whole. It is, however, in the final chapter of this section and in the chapters comprising Part III that the need for major criticism becomes rather acute. This would seem to follow from the method employed and the deliberate avoidance of material so necessary if the current regional geography of the area is to be adequately portrayed and understood. In the final chapter of Part II, we are led to expect an analysis of the modern scene but in fact there is little at all applicable to this century. During the last thirty years the two industrial units of North England have been tremendously influenced by a series of major events and have themselves been laboratories in which significant social and economic investigations have been carried out, with repercussions on the country as a whole. In Part III the author's apparent dislike of, for example, statistical material puts the reader—and especially the younger one—in no proper position to appreciate these facts and their influence on the present scene. The scale and degree of recent economic and social circumstances are too lightly sketched and, surprisingly, the author seems to fall short of the Editor's claim on his behalf. Professor Smailes becomes too remote and detached in these otherwise interesting chapters to bring the area fully to life. As an introduction they are good and one must hope they not only provoke the reader's interest but stimulate him to further enquiry.

The final pages of this book include a series of well-chosen photographs and a list of selected references. Attention might here be drawn to the *Bibliography of Northumberland and Tyneside* by W. C. Donkin and E. F. Patterson, published in 1946 for the Ministry of Town and Country Planning by H.M.S.O. and the *Outline Bibliography of the Northern Region* by W. C. Donkin published jointly by King's College in the University of Durham, the North East Industrial and Development Association and the Cumberland Development Council in 1956. G.H.J.D.

Europe from the air. By Emil Egli and Hans Richard Müller (Editor). With an introduction by Salvador de Madriaga. 11×8³/₄. Pp. 223. London: George G. Harap & Co. Ltd, 1959. 63s.

This volume of 184 skilfully selected and fully annotated photographs is presented as a contribution towards the concept of a European community. As such it deserves high praise. The extent to which it achieves this aim will rest primarily with the individual reader. Two introductory essays, while effectively stating the theme, tend to stray into the simplifications of environmentalism and of geopolitical thought. The photographs, however, are well able to speak for themselves. Mainly low oblique views of high quality they are arranged broadly

in the groupings of systematic geography and span the physical, agricultural, urban, industrial and transport landscapes. Understandably, perhaps, there is some emphasis on "Little Europe" and presumably on grounds of inaccessibility there are few examples from communist Europe. A map of locations would have been a valuable asset. The eleven colour photographs included are of interest but tend mainly to emphasise the qualities and consistent excellence of the monochrome prints. N.R.E.

The Evolution of the Rural Land Use Pattern in Cyprus. by D. Christodoulou. 8½×11. Pp. 230. 117 maps and diagrams, and 1 folded map in pocket. Bude: Geographical Publications Ltd, 1959. 25s.

This second Monograph in the series published on behalf of the World Land Use Survey (under the aegis of the International Geographical Union) is, like its predecessor, in a format very similar to the County Reports of the Land Utilisation Survey of Britain. There is not however, and indeed scarcely could be, a standard pattern of contents for diverse monographs which may cover any part of the world. The present work is based on the thesis prepared by Dr D. Christodoulou for the Ph.D. degree of London University. An excellent thesis it is, and it will certainly be a standard work on Cyprus for many years. Its twenty chapters cover all the subjects which one would expect to see covered—from the physical background, through the history of settlement, to the present-day land use. Certain specialised subjects are included because of their peculiar importance to Cyprus; thus chapter VIII deals with "Land Tenure and Water Rights", and chapter XVII with "Viticulture", while the inclusion of a chapter (IX) on "Finance" is a salutary reminder to geographers that they often give insufficient attention to this mundane but essential matter.

Dr Christodoulou is to be most heartily congratulated on this work, which, though written by a Greek Cypriot, seems to the reviewer to bear the mark of most praiseworthy professional impartiality—a quality very often lacking in the recent troubled affairs of the island. One can inevitably find here and there a few technical points which seem open to question; one only may be mentioned, and that is the rather misleading diagram in Figure 33, purporting to show rainfall and potential evaporation through the year at Akhyritou and Nicosia—it can scarcely be believed that the potential evaporation at these two places reaches in July 20 inches and 14 inches respectively, and one wonders just how these figures were obtained, for they are certainly not in accord with those recently measured in Malta, or with values estimated by formula from other meteorological elements.

In a pocket is included the 1:253,440 Land Use Map prepared from R.A.F. air photographs by R. R. Rawson and K. R. Sealy at the London School of Economics. This cannot be so highly praised as the book itself, for it reveals too many discrepancies (e.g. as to irrigated areas) both from the small text-maps of Dr Christodoulou's, and from the excellent "Pasture" maps subsequently prepared by Hunting Technical Services Ltd., which are summarily described in Appendix II. (Appendix I is an excellent bibliography of works in English, Greek, and other languages). The map is nevertheless a good example of clear and effective representation of a dozen different categories in only two colours, and the fact that it shows discrepancies from a map produced from an expensive and skilled special survey should not prevent the example from being emulated. F.H.W.G.

La Region Parisienne. By P. George and P. Randet. 9 × 6. Pp. 160. 23 figs. 16 plates. 12 tables. Paris: Presses Universitaires de France, 1959.

A large part of the Paris Basin comes within the scope of this book, for it deals not only with the conurbation of Greater Paris, but also with an extensive surrounding area in which Paris is of paramount importance in the present-day geography. After a brief outline of the growth of the modern urban agglomeration, its multifarious activities and the internal structure of the urban area are analysed. The sphere of influence of the great city is then dealt with in terms of population distribution and circulation, land-use, industry, and the network of communications

that knits together the great complex. An especially interesting treatment of the surviving features of the old industrial pattern and the effects of the decentralisation of metropolitan industry is provided. The book is excellently illustrated by appropriate maps and well-chosen photographs, mostly oblique aerial perspectives. Its statements are firmly based upon statistical data but the text is perhaps rather heavily loaded with statistics. This new volume does not replace the admirable little studies of Paris and its region by Demangeon and Perpillou in Editions Bourrelrier, but it is a most useful, up-to-date supplement to them. A.E.S.

The Native Pinewoods of Scotland. By Professor H. M. Steven and Dr A. Carlisle. 10 × 7½. Pp. XV+368. 20 plates. 39 figures. Edinburgh: Oliver & Boyd, 1959, 63s.

Although this excellent and detailed study of our most important native conifer will probably have more appeal to the forester than to the geographer, it cannot fail to be of interest to all who are concerned with the preservation of something so truly Scottish as our native Scots Pine.

The authors have traced the history of this tree from Pleistocene times to the present day. They describe the distribution of Scots Pine throughout the world and the relationship of our native pine tree with Scots Pine found in other countries. The ecology of our pine woods is dealt with very fully and this section of the book will be of interest to botanists and naturalists as well as to foresters.

Perhaps the most valuable part of the study is that which describes in great detail the thirty-five stands of truly native pine which still exist in Scotland. The authors have made out a strong case for the preservation of these stands. They have shown that these pinewoods contain unique strains which will be of value to British forestry, that they are an interesting survival of our native vegetation with a distinctive flora and fauna and that they are historical monuments of Scotland which should not be allowed to disappear.

The morphological variation found in the different types of native pine are faithfully described and show that there is a close relationship between our native Scots Pine and that of South Sweden. This is a discovery which may provide geographers with matter for further study.

Woodlands have many uses, but primarily they are sources of valuable raw material, namely timber, but this aspect of our native pinewoods is barely mentioned in the book under review. Professor Steven and Dr Carlisle have shown very convincingly that in the remaining thirty-five stands of native pine there are trees which have desirable silvicultural characteristics which are genetically determined. It would have been fascinating if they had been able to pursue their investigations into the timber qualities of the different strains.

The Native Pinewoods of Scotland contains a detailed and comprehensive record of our native pines. It also presents an irrefutable case for the preservation of the remnants which we still possess, but which cannot long survive without man's active intervention on their behalf. It is these two aspects of the study which will be of the greatest interest to geographers.

The book is excellently produced; both the paper and the printing are of the highest quality, but it is disappointing that the photographs are not in keeping with the rest of the book. H.A.M.

AMERICA

The St Lawrence Seaway. By T. L. Hills. 8¼ × 5¾. Pp. 157. 20 plates. 3 maps. London: Methuen and Co Ltd, 1959, 12s.6d.

For Canadians the opening of the St Lawrence Seaway has been one of the great events of 1959. The successful outcome of protracted negotiations with many United States authorities, in the face of powerful adverse lobbying, means that this great project represents more than a very large hydro-electric power scheme and improved access for shipping from the Atlantic to the head of the Great Lakes; it is also a symbol of national prestige.

Mr Hill's timely little book tells us what it is all about, being an excellent short guide not only to the seaway itself, but also to the history of the project since its early pre-industrial origins; the physical, political and economic difficulties are concisely outlined, and a chapter is devoted to some of the possible consequences of the seaway and the provision of new sources of electrical power. There are some useful photographs, but a geographer might have been expected to offer more and better maps and diagrams; it is not easy to locate many of the places mentioned, and a larger-scale map of the section from Lake Ontario to Montreal, showing clearly the physical features of this stretch, would have added greatly to the book's value. Nevertheless, the book is to be recommended, summarising so clearly much information not readily available. A.M.

Studies of Highway Development and Geographic Change. By W. L. Garrison, J. L. Berry, D. F. Marble, J. D. Nystuen and R. L. Morrill. 10½ × 8. Pp. X + 291. 55 figs. 55 tables. Seattle: University of Washington Press, 1959, \$7.00.

This book deals with indirect highway benefits in respect of American experience and examines particularly the impact of highways on urban development. It represents perhaps the first major contribution by geographers to what might be called geo-econometric studies.

The first section of the book assesses current location theories and discusses the full meaning of indirect highway benefits. The core of the book is however a series of studies relating to highways and retail business, urban and residential land-use and customer movement and retail business location. These studies will be of importance to the urban geographer in particular.

The method of approach followed throughout is that of question followed by assessment implemented by case studies. Problems posed include; how are retail establishments arrayed in space and in association with one another? what are the function of retail clusters? what motivates customers to use one centre rather than another? how does the Central Business District function in relation to consumers and to other retail centres within the urban tract? In reviewing the existing thought on these problems the authors do much to put things in correct perspective. New avenues of approach to several previously stated problems are taken and new conclusions are drawn. Here the value of case studies is of particular relevance.

The closing section of the book is devoted to an examination of the distribution of doctors and patients, noting, among other things, the tendency of doctors to congregate at nodal points.

The appearance of this work is timely when much is being said about highway and motorway building in Britain. The book may, however, be too scientific to be popular but nevertheless Professor Garrison and his collaborators have provided the first true foundation steps towards a theoretical framework for economic urban geography. M.J.W.

ASIA

The Pattern of Asia. Edited by Norton Ginsberg. 9¼ × 6. Pp. XIV + 929. 36 maps. 161 figs. End-paper maps. Englewood Cliffs (N.J.): Prentice and Hall Inc., 1959, \$11.65.

The Preface of *The Pattern of Asia* commences... "This is a preface to be read". So is the whole book, for Norton Ginsberg, Professor of Geography at Chicago and his five co-authors have brought forth a magnificent and up-to-date account of the geography of Asia.

The theme of the book is the changing political and economic geography of the largest continent and the emphasis is on the processes of change at work in the evolving landscape. After a short general introduction, the book is sub-divided into regional sections, each an entity in itself, on East, South-East, South, South-West and Soviet Asia. Each section has its own introduction, followed by country-by-country accounts.

The Pattern of Asia is lavishly illustrated and the uniformly prepared maps and excellently chosen photographs are fully integrated with the text. One such illustration, a vertical air-photograph of Delhi with a key and summary explanation on the facing page (p. 38) exemplifies the excellence of the presentation. Each section has a bibliography with a useful commentary. A final chapter summarising the processes of change for the whole continent would have been valuable, but the *Pattern of Asia* is a standard text and is worth its price. J.B.C.

Man in Malaya. By B. W. Hodder 8 $\frac{3}{4}$ × 5 $\frac{3}{4}$. Pp. 144. 25 maps and diagrams. 16 plates. London: University of London Press, 1959, 12s.6d.

The author's four-and-a-half years in Malaya before he moved to Ghana were fruitful ones and his local surveys of racial groupings and settlement conditions around Singapore and Kuala Lumpur have been reported in the *Malayan Journal of Tropical Geography*. The present book transfers these studies onto a larger canvas, and the result is very convincing, though disturbing in the sense that a plural society of three such distinctive races is unlikely to be given the time it needs to settle down together. The author quotes Sir Richard Winstedt who maintains that no political system can fuse races of differing colours, religions and civilisations as is offered by Malays, Chinese and Indians. The Malay probably has most to lose in any failure to fuse with the more recent immigrants.

The author gives a clear account of the gradual elimination of the squatters by putting them into new villages which offer better security from terrorists and better economic prospects. The only effective answer to Communism lies in giving the villager — in this case the Malay rather than the Chinese — security of land tenure, reasonable amenities in the way of schools and public services, and economic opportunity. One of the most successful schemes for extending the arable area took place in the Tanjong Karang of Kuala Selangor, where 100,000 acres of formerly useless swamp have been converted to paddy and coconut, with access roads and paths; some 80,000 people now live there, growing rice on peat overlying clay, though it takes a matter of five years to destroy the peat by mixing it with the clay subsoil.

The author states that "for geographers this book should be looked upon only as supplementary to regional studies of the country available elsewhere" but the excellent bibliographical list shows how widely scattered such references are; we should be grateful to Mr Hodder for such a very concise and lucid study.

R.M.G.

AUSTRALIA

Biogeography and Ecology in Australia. Edited by A. Keast, R. L. Crocker and C. S. Christian. 9 $\frac{3}{4}$ × 6 $\frac{3}{4}$. Pp. 646. Numerous figs, tables and plates. Den Haag: Uitgeverij Dr W. Junk, 1959.

The panel of experts—the symposium—and the now popular and voluminous collections of articles on diverse though inter-related topics is providing the answer — or part of it — to increasing specialisation within common fields of knowledge. And though the result may be weighty, uneven, and can rarely be comprehensive or definitive, it must be admitted that it serves a useful purpose in bringing together a wealth of information which is widely dispersed and not always easily accessible to one worker.

The fields of biogeography and ecology are wide, ill-defined and complex in their depth, ramifications and implications; as yet their surfaces have only been lightly and unevenly scratched. This new collection of facts about Australia will be welcomed by all those interested either in the continent itself or in ecology and biogeography. The editors, perhaps wisely, do not attempt to define or differentiate between these two terms. They use them as a convenient umbrella under which thirty-five essays dealing with various aspects of animal, plant and human life, in relation to the particular 'habitat' provided by Australia, are

discussed. Each is written by a specialist in what the editors claim to be "a rather factual, modest and scientific style".

We are reminded in a first general chapter, which bravely attempts to summarise the rest of the book, of the peculiar individuality of Australia's biogeography. This is followed by a statement of the known facts of its physical environment. Over half of the remainder of the essays deal with animal ecology—ranging from marsupials and birds (3 chapters each) to fish, reptiles, frogs, insects etc.; the rest deals with past and present climates, types of vegetation, soil ecology, agricultural assessment and nature conservation.

While the book contains a wealth of specialised zoology and botany there are few chapters which do not provide some grist for the geographer's mill. The distribution and ecology of both plants and animals provide an often sensitive index not only to physical conditions and their fluctuations, but to a 'habitat' in which man has, particularly since white settlement, become an important if not dominant factor. And the 'boomerang' effect of man's growing influence, in what has been termed by ecologists as "the biome", is strikingly illustrated in such essays as those on the introduction of Merino sheep, the rabbit and the prickly pear.

Two chapters, only, however, deal with that prickly concept of "Human Ecology": the first treats of primitive aboriginal man, his adaptation to the environment and the extent of his effect on it before the arrival of the white man; the second by Professor Griffith Taylor is on "Human Ecology in Australia". One is reluctant to admit that for the geographer interested in either Australia or ecology this latter chapter is much less useful and stimulating than its title might suggest. An effort to equate 'geography' and 'human ecology' is marred by a narrow and questionable definition of ecology and an aggressively deterministic concept of geography: the result is a brief and already familiar account of Australia under the headings, "Environmental Controls" (physical factors and their effects) and "The Human Response" (an historical outline of white colonisation and settlement). And familiar maps reproduced without a caption and at a size that makes them practically illegible are not the best advertisements for the geographer.

However for those concerned with either the geography of Australia or regional illustrations of ecological principles, this collection of essays provides a wealth of fundamental and basic material. It also provides the geographer with much of the material from which he could build a Biogeography of Australia. J.T.

Australia and the South Seas. By B. Lohse. Translated by K. S. Whitton. 9½ × 7. Pp. 119. 153 Plates, 2 end-paper maps. Edinburgh: Oliver and Boyd, 1959, 25s.

Daily we are confronted with more and more travel books, yet this one stands out from many of its contemporaries. Here there is little of the mental sunburn which so often accompanies the average travelogue. Instead Herr Lohse punctuates his descriptions of countryside and people with searching questions relating to the places and people he meets on his journey. Coming from outside the Commonwealth, these remarks bear perhaps greater weight.

The book is not a complete account of Australia and the South Seas and it might have been better to have retained the element of the rapid transit made by the author by keeping "To-day" in the title as has been done in the original German. It is rather an account of impressions collected on a journey, all too brief, through Australia and the South Sea islands.

Very thoughtfully the author describes his impressions of Australia, a country of opportunity and of problems. The first thing he finds he must come to terms with is the scale of the country. "The distances in particular, and also the population density", he says, "make the greatest possible contrast with what we know in little Europe".

Herr Lohse however passes through the huge empty land of Australia to the smaller islands of Polynesia. Here he becomes almost completely spellbound and we miss his previous penetrating comment, although, when he finally reaches the Hawaiian Islands, this critical capacity again asserts itself.

The book is beautifully illustrated with splendid photographs, in black and white, which supplement the text. It is unfortunate that the dust cover is not better drawn as this will deter many potential readers but this is perhaps a carping criticism when after all, one cannot judge a book by its cover I.A.G.K.

ARCTIC AND ANTARCTIC

The White Road. By L. P. Kirwan. 8¾ × 5¾. Pp. 374. Illustrated. London: Hollis & Carter, 1959.

The White Road, by L. P. Kirwan, Director of the Royal Geographical Society is, as one would expect from such a source, an excellent survey of polar exploration from 320 B.C. to 1958 A.D., and possesses the notable merits of accuracy, brevity and extreme readability. Within the limits of 374 pages, the author traces man's penetration of polar mysteries from Pytheas, in his square-sailed Greek galley, seeking out Iceland to Fuchs with his Sno-cats blazing the trail from Vahsel Bay to McMurdo Sound. The flowing and ebbing of the tides of public opinion and political interest play their parts in the direction taken by exploration from age to age, and the personalities and careers of the men who played the leading rôles are critically analysed. This the author is extremely well qualified to do as his position at the Royal Geographical Society has brought him into personal contact with the leading figures of Arctic and Antarctic exploration of yesterday and today; his own and other corresponding libraries have been laid under toll in the search for the best and most reliable material, and he has had first-hand experience of expedition planning and organisation. The book deals chronologically with polar exploration — The Age of Discovery, The Age of Exploration, The Age of Adventure and Research, The Heroic Age, and a Postscript bringing the chronicle up-to-date. The scene shifts from Arctic to Antarctic from time to time, and sometimes the same characters and the same ships see service at polar extremes. The periodic change in emphasis is marked, too, from filling gaps in the world map to finding new passages to the wealth of other lands, from spectacular exploits to scientific research, from the single-handed endeavour to the international teams and fleets of the I.G.Y. Mystery and tragedy are intermingled — the loss of the Franklin Expedition, the secrecy surrounding Peary's reaching the North Pole and the publicity of Dr Cook's allegations of priority, the rivalry between Scott and Shackleton and Amundsen, Andree's balloon and Nobile's airship, Wilkins' *Nautilus* and the latest U.S.A. atom-powered submarine's exploit are all recorded and evaluated. The book is fairly large — but so is the subject; a few more maps would have been an advantage; and so would have been a bigger fount for the useful index. D.A.A.

America in the Antarctic to 1840. By P. I. Mitterling. 9½ × 6½. Pp. VIII + 201. 4 maps. Urbana, Illinois: University of Illinois Press, 1959, \$5.00.

America in the Antarctic to 1840 by Philip I. Mitterling, is an odd book very much resembling the curate's egg. The author has carefully combed reference libraries and other sources, bringing together much interesting historic and geographic material, but he has produced a most indigestible mixture. For his work on source material and the reference section, sincere acknowledgements are due, but when he attempts to use the material an extraordinary journalistic strain becomes evident, to the detriment of the volume. His first chapter opens with 1838 and the ships of the U.S. Exploring Expedition about to sail for the Antarctic to follow the course of James Weddell who reached 74° S., and in seventeen pages is dealing with the I.G.Y. work in the Antarctic in 1958, with a few of the odder items from a naturalist's notes thrown in. Succeeding chapters give details of the early American sealers' voyages, together with their trade routes and ports of call, when sealing became a kind of gold rush. One cannot but deplore the author's habit of "fathering" observations on his heroes, an error both geographers and historians would avoid... "He had probably noticed the highlands of Antarctic from Deception Island before venturing south to explore, although he does not expressly say so in his log book." Again he heads a chapter "Nathaniel Palmer — Discoverer of Antarctica?" but five pages later goes on to say that Edward Bransfield sighted the Antarctic continent ten months earlier! The central section of the book, entitled "Holes in the Poles", gives in some detail the odd hypothesis of one John Cleves Symmes, a former captain of the United States Infantry, that the earth consisted of hollow concentric spheres with apertures at either pole and is germane to the subject inasmuch as the theory stirred public attention to Polar exploration

to find the alleged holes. As Symmes became aged and infirm, Jeremiah N. Reynolds, an obvious exhibitionist, took over and ran a campaign for the U.S.A. to sponsor an exploration of high latitudes in the south, gradually getting his theme adopted for reasons of national prestige. Eventually the expedition was sanctioned by the government and a team of scientists nominated to assist in various fields of exploration. The early mishaps of ill-planning make interesting reading. The first commander Thomas Catesby Jones was relieved of his command, and eventually Charles Wilkes, a Lieutenant in the Navy took over. In 1839 the expedition did set sail, but was too late in the season to do much. The following year they made a second attempt, but the descriptions of the ships and their equipment when they left Sydney augured ill for any success. They got as far as 67° S., and kept hoping to see the Antarctic continent. This was reported by Wilkes in his log for January 30th, but immediately after they had to turn northwards on account of an outbreak of sickness among the crew. A second ship, while clearly nearing land, ran into an iceberg and had to retreat from the south. A third had equally bad luck. James Clark Ross later disproved the occurrence of land in some of the alleged positions, and the expedition's work was allowed to fade out in its own country, after an unedifying court-martial which naturally failed to discover the truth. D.A.A.

GEOMORPHOLOGY

Beaches and Coasts. By C. A. M. King. $9\frac{1}{2} \times 6\frac{1}{2}$. Pp. 403. 149 illustrations, maps and diagrams. London: Edward Arnold Ltd, 1959. 65s.

Coastal geomorphology after the Second World War differs in many ways significantly from the scientific activities described by the same term in the first decades of the twentieth century. Classical coastal geomorphology was characterised by mapping and description, and by analysis of form-elements and hypothetical classification of shorelines, according to stage of development, from a Davisian point of view, emphasising the influence of isostatic movements. Modern scientific activity in the field of coastal geography is first and foremost a study of the processes which form the configuration of the shoreline and which are responsible for the development of the beach profile. The dynamic aspects are thus emphasised now, and when working out results on the basis of observations in nature, as well as in experimental basins, the use of mathematical and geophysical methods is a typical feature.

D. W. Johnson's text book, *Shore Processes and Shoreline Development*. (Wylie & Sons, 1919), was a brilliant compilation, representing in a pedagogically admirable way the state of knowledge of the period. For teaching at the university level Johnson's book has been most valuable. Modern manuals however by Steers, Guilcher and Shepard have, each in their own way, replaced Johnson's book in university teaching. King's book, *Beaches and Coasts*, will be welcomed as a most useful supplementary volume on the coast-geographer's bookshelf. The book is more than that: it is a valuable complementary volume too, because it gives not only the mathematical points of view concerning problems such as, for example, beach drifting and wave refraction, but also the theoretical background for the hypothesis of equilibrium forms, vertical as well as horizontal.

In twelve chapters, each of which is supplied with elaborate lists of references, King deals with all topics associated with beach formation and shoreline development. The theory of waves is presented with particular attention to the theme, emphasising in specific chapters the two main types from this point of view, the constructive waves and the destructive waves.

The illustrations, maps, profiles and diagrams, drawn in a sober professional and technical style, are in keeping with the text; the graphic descriptions thus represent in a visual way the same type of expert knowledge.

The author's work is not merely a compilation of facts and results, it is a discussion too of modern hypotheses — for example the chapter dealing with classification systems of coast types (Johnson, Shepard, Cotton, Valentin). Here, as is the case also in other chapters, we are introduced to the author as a prominent personage and scientist whose contribution to our textbook literature by this book is unquestioned. The work will impress its mark on future university teaching and in this way on the evolution of coastal research. A.S.

MAPS AND ATLASES

Világatlasz. $19\frac{1}{2} \times 9\frac{3}{4}$. Pp. 80 (maps), 112 (index). Two end-paper maps. Budapest : Kartográfiai Vállalat, 1959. 175 Ft.

Eastern European countries are nowadays seldom prepared to allow the export of maps and cartographic works. The presentation to the Society of *Világatlasz* by its Hungarian producers is, therefore, all the more welcome.

As an example of cartography within the Soviet block there is the clear impress of Russian ideas in the use of symbols and layout though lettering appears influenced by modern German practice. Relief representation by hill-shading is subdued and not displeasing except for an unfortunate break in the use of colour between the brown of uplands and the green of lowlands, a fault which characterised early examples of the rather similar German Wenschow system. The map of Hungary showing physical features at 1:1.1 million is, however, pleasing and of distinctly better execution than the other physical maps of the continent. The majority of the maps are coloured politically although a faint grey plate is retained to show hill-shading. In their Preface the authors make it quite clear that their purpose has been to construct a political rather than a physical atlas. They also stress the use of the most up-to-date information in the compilation of the atlas, which was completed in December 1958. In general, reliability of communications and place names is good, but some interesting examples of interpretation of political boundaries occur, for example, the boundaries between India and Burma and China are those claimed by the Chinese. The pattern of communications contains some information, for instance, in Eastern Europe, which has not generally appeared on western atlases. There are numerous small inset maps of the major world cities and the towns of Hungary, as well as insets of island groups such as Hawaii and the Atlantic islands.

This atlas is claimed by its authors to be the most detailed atlas available in Hungary and to set a new standard of Hungarian atlas-making. If it is thus a first attempt, it is not unworthy of its creators. R.E.H.M.

GENERAL

Teaching Geography in Junior Schools. $9\frac{3}{4} \times 6\frac{1}{4}$. Pp. 46. 4 figures and 2 plates. Sheffield : The Geographical Association, 1959, 3s.6d.

This handbook has been prepared by a committee of the Geographical Association and replaces a similar publication entitled *Geography in the Primary School*. The chapter headings indicate the scope and content of the work viz:—Planning the Syllabus, Local Geography, Studies outside the local area, Maps, Atlases and Globes, and Making Records. In addition there are very useful appendices giving lists of books, sources of materials, and information and recommended equipment for primary teaching.

In a book of this type, brevity is a virtue, and no primary teacher need grudge the hour or two spent in reading it. The information, advice and suggestions will be particularly welcome to teachers in training, and it should also prove a valuable guide to those entrusted with the task of drawing up Schemes of Work for Primary Schools. R.B.S.

New Viewpoints in Geography. Edited by Preston James. 9×6 . Pp. XI+260. Part One, 15 figs. Part Two, 4 figs. Washington : Twenty-Ninth Yearbook of the National Council for the Social Studies, 1959.

In such a dynamic world as the present, it is inevitable that geographers are seldom completely satisfied with the methodology of their subject. This volume consists of contributions on modern aspects of geography by a group of eminent

and experienced American geographers. Part one examines new viewpoints at an academic level; part two discusses their relation and general application to the teaching of geography in the United States.

To the earnest but modest student, the first part is an invitation to further discipline in the subject. Within the familiar aspects of geography, modern concepts and theories are outlined along with the names of the authors and their publications. Many are the exciting and exacting developments. Fundamental differences are apparent between the traditional youth, maturity, old-age cycle of rivers and the modern analysis of slope development. A new picture is provided of the general circulation of the atmosphere and of monsoonal conditions. Recent work in world population changes is reviewed. In the realm of economic geography, the merits of the newer 'macro' or aggregate analysis approach are submitted as a contrast to the customary 'micro' or local conditionality treatment. In cartography, improvements in the representation of surface configuration such as merged layer-tinting and shaded relief are explained with the aid of map diagrams. New projections as well as new ways of using familiar projections, to illustrate intercontinental relationships, are described and illustrated. *The Times Atlas of the World*, edited by John Bartholomew, is included in an informative bibliography of recent atlases.

Part Two deals with the teaching of geography in the context of Social Studies in American schools. There is useful and detailed guidance for the teacher in the treatment of geography out-of-doors. In a chapter on maps and globes, a plea is made for atlases and globes at different age levels. The limitations of map symbols is discussed and the use of pictures in conjunction with maps is advocated. The place of physical and historical geography in the school syllabus is also examined. There is a suggestion from Preston James for the treatment of the world via seven major 'culture areas'. Much of this part of the book is already familiar to practising teachers who, it must be admitted, may expect a lengthy time lag before some of the newer viewpoints of Part One appear at school level. Supremely important, however, are the sections, provocative and stimulating, which deal with the introduction and development, in pupils, of geographic concepts, generalisations and skills. Such a theme might well have been extended to cover modern techniques in use or under test in the United States for measuring pupils' achievements in geographic understanding.

This comprehensive study of academic and pedagogic geography concludes with an up-to-date and factual account of the teaching of geography in the Soviet Union. G.R.

Demography. By P. R. Cox. $8\frac{3}{4} \times 5\frac{1}{2}$. Pp. XIV + 346. 12 Figs. Cambridge: The University Press, 1959. 25s.

The geographer must know a certain amount about many fields of study. Population is one of the most vital, and Mr Cox's *Demography* provides an extremely useful background, even though the book is intended primarily for actuarial students and is one of a series on the subject. The style is simple and clear, but the author presupposes the reader's knowledge of various methods and technical terms, and the geographer may therefore be forgiven for avoiding certain chapters.

The book is concerned with what material there is on population and how it can be used, rather than with what can be shown about a given population at a particular time and specific examples are thus incidental though often illuminating. The author first discusses the ways in which data are gathered, censuses and registration being the main sources. He indicates some of the inaccuracies that may occur through wrong or incomplete answers. He then has a section on the interpretation of data. This is followed by notes on the demographic features of selected regions of the world. Finally he deals with the measurement of disability.

The book includes many interesting points. We are reminded, for example, that a questionnaire should be as brief as possible in order not to induce indifference among the persons questioned; that if existing data are often far from accurate, predictions are even more precarious, though methods of making these are perhaps sounder than a few decades ago; or that the maximum possible rate of natural

growth of a human population is probably a little over 3 per cent per annum.

For the geographer it is useful to have all this matter in one volume and, even if most of the examples are from Britain, the book is a most useful work.

J.P.C.

Military Aspects of World Political Geography. Air Force Reserve Officers' Training Corps. 10 × 7; pp. XI + 550; figs. 152. 22 tables. Alabama: Air University, Maxwell Air Force Base, 1959.

This well-produced volume has been prepared for use in the educational programme of the American Air Force Reserve Officers' Training Corps. It represents the work of a group of authors in whose selection the Association of American Geographers played a part. The first few chapters are mainly concerned with the basic principles of political geography and make both interesting and stimulating reading but the space available for this review means that the temptation to examine many points in detail must be resisted. Generally these chapters are clear and precise, refreshingly free from jargon and represent well-balanced statements. They are followed by a series of chapters, thirteen in all, on defined units of the earth's surface, Anglo-America, Latin America, the U.S.S.R., the Arctic and so on. The treatment is not too uneven and the condensation of material generally satisfactory but the absence of bibliographies is unfortunate. Many conclusions reached or summaries made are very provoking, as might well be expected. The position of Western Europe as seen through American eyes is as likely to initiate debate as is the assessment of the internal political structures and pressures of Africa. In the Preface to this publication the claim is made that it will make a significant contribution to the professional education of the future Air Force Officer and give him an increased understanding of and ability to cope with his military and civil responsibilities. Read critically and with a preparedness to follow up the many leads and ideas provoked by this work, this claim can be substantiated. In addition, it is a work able to be regarded as a most useful addition to the total resources of all students of political geography.

G.H.J.D.

Geographisches Taschenbuch 1958/59. Edited by Professor E. Meyen. 6³/₄ × 4³/₄. Text pp. 548. Index pp. 98. Numerous tables, maps, diagrams and photographs. Wiesbaden: Franz Steiner Verlag, G.M.B.H., 1959.

The latest volume of this splendid biennial publication contains a fresh mine of invaluable geographical information presented in a straightforward manner and illustrated with a variety of exquisite little maps and diagrams. All special topics appearing in this and previous volumes are listed in the index. Amongst interesting items included in the current volume are: list of Geographical Medals awarded by American, English, German, French, Swiss and Spanish Geographical Societies, (but no R.S.G.S. medals are mentioned); timetable of Geographical events and personalities (1750-1959); catalogue of German regional geographical organisations and higher training-centres for Geography and related sciences; world Hydrographic Services; list of Geographical Magazines; Polar Bibliography; Latin American Bibliography; Alpine and other main passes in Europe and the world; Millionaire cities: — Europe (25), Africa (2), North America (16), South America (5), Asia (13), Australia (2); National Parks in Europe; regional accounts for Belgium, Iraq, Nigeria, Indonesia, Japan, Taiwan, Australia and the West Indies; I.G.Y. Expeditions in the Antarctic 1956-7, and Atlantic Ocean, 1957-8; German Himalayan expedition; biographies of Carl Ritter and Alexander von Humboldt whose centenaries occurred in 1959; sea-ice glossary — German/English/Russian; glossary of ocean-bottom features — German/English/French; karst landform vocabulary in six languages; classification of maps by scale and topic.

This publication is a good example of German thoroughness which could well be emulated in this country.

J.C.K.

A LIST OF THE CHAIRMEN AND SECRETARIES OF THE DUNDEE CENTRE
OF THE ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

The list was compiled from the Minute Book of the Dundee Centre. The Minutes do not provide an uninterrupted record. There is a gap from 19th July 1897 to 15th January 1912, and another from 15th January 1912 to 11th May 1917. Consequently it is not always possible to ascertain from this source the exact dates of election and resignation of office-bearers.

CHAIRMAN

1884 - 1891	Principal Peterson	nute of 11th May 1917,
1891 - 1894	Capt. Clayhills Henderson	there is an expression of
1894 - 1896	Ex-Bailie Robertson	the great loss suffered by
1896 - ?	Mr J. J. Weinberg	the Society by the death
	(In the Minute of 15th	of Mr Don, Chairman of
	June 1912, there is an ex-	the Centre for a number of
	pression of the great loss	years.)
	suffered by the Society by	? - 1932
	the death of Mr Weinberg.	Dr J. C. Buist. (Minute of
	The Minute refers to his	30th October 1917, refers
	being Chairman for many	to Mr Buist as Chairman.)
	years.)	1932 - 1938
	Mr R. B. Don. (Mr. Don	Mr G. R. Donald
P - ?	took the Chair at a meeting	1938 - 1939
	which was held on 15th	Mr A. F. Stewart
	January 1912. In the Mi-	1939 - 1946
		Mr D. D. Taylor
		1946 - 1949
		Dr G. A. Cumming
		1949 - 1956
		Mr J. Watson
		1956 -
		Miss I. A. Tyrrie

SECRETARY

1884 - 1917	Mr D. Wylie	1934 - 1948	Mr W. Harris
1917	Mr Mackay,	1948 - 1952	Mr S. J. Jones
	(Acting Secretary)	1952 - 1956	Mr D. M. Brown
1917 - 1920	Mr J. F. Simpson	1956 -	Miss J. C. Nicoll
1934 -	Miss M. Martin,		
	(Interim Secretary)		

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

PROCEEDINGS

Meetings of Council were held on 3rd June and 29th July 1960.

ANNUAL GENERAL MEETING

The Annual General Meeting will be held in the Society's Rooms, Edinburgh, on Tuesday, 18th October 1960.

ANNUAL SUMMER EXCURSION

The Excursion took the form of a journey by Television Train from Glasgow to Fort William on 28th May. During the journey a broadcast commentary on the landscape features was given by Professor R. Miller.

SOCIETY'S TOURS

During the months of May to August 224 members of the Society took part in the tours to Prague, Vienna, Budapest and Oberammergau.

Land in British Honduras

A report of the British Honduras Land Use Survey Team. Prepared in three parts, it is intended as a stock-taking of the soil resources of the territory. Part I summarizes the natural factors of geography, climate, geology, vegetation, and population; Part II is an account of the soils and their potentialities; and Part III describes current land use and suggests ways of developing the soil resources in the light of the natural factors described in Part I. Fully illustrated and indexed, with a separate folder of 7 large maps. 55s. (post 1s. 9d.)

Colonial Office List 1960

Assembling in one volume information otherwise only available from a number of sources, this reference book is indispensable to anyone whose work, studies or interests lie with the dependent territories.

35s. (post 1s. 3d.)

The Colonial Territories

A comprehensive overall picture of events and developments in British colonial and protected territories from April 1959 to March 1960. (Cmnd. 1065) 6s. 6d. (post 6d.)

From the Government Bookshop
13a Castle Street, Edinburgh 2
or through any bookseller

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Vol. 76 (2) September 1960

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St John's College, Cambridge.

R.S.G.S. GLASGOW : TRAVELLER'S SECTION

On the initiative of Mr J. Allan Bremner, now chairman, R.S.G.S., Glasgow, a fascinating new section of the society's activities has been created. Believing as he does in the value of travel, and knowing that many members now can engage in it, he has created a quite informal opportunity for members to show their pictures and talk about them. It is in no sense in competition with our formal lectures but is a "do it yourself" supplement to them. Attendances have been between 90 and 100 and subjects have ranged from Iona to Andorra and Honolulu. Details are to be found in the Glasgow prospectus.

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